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RESEARCH REPORT

B.F. Goodrich

FIRST IN RUBBER



New baggage panel is air-tight yet easily opened, strong yet flexible

PLANS for Lockheed's Super Constellation called for two big baggage compartments in the lower section of the fuselage. But the panels housing the compartments presented some tough engineering problems.

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panels out of a glass fabric reinforced with a special rubber compound. Not only did the panels prove air-tight, oil-resistant and flame-retardant, they had the necessary flexibility, wear resistance and strength. They even passed a severe 'galloping nut' characteristic of the impact of heavy, sharp-cornered baggage.

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inside a Super Constellation's baggage compartment, shows panels being unzipped and unzipped.

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Aviation Week

NOVEMBER 15, 1954

VOL. 41, NO. 30

Editorial Offices
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Washington 4, D. C. — National Press Bldg., Phone National 4-3324
Los Angeles 17-1115 Wilshire Blvd., Phone MA 6000 4-3322

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Aviation Week is served by Press Associates, Inc., a subsidiary of Associated Press.

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AVIATION WEEK • NOVEMBER 15, 1954 • Vol. 41, No. 30
Master A87 and ABC



Published weekly by National Aeronautics Association, Inc., 1200 15th St., N.W., Washington 5, D.C. Second-class postage paid at New York, N.Y., and at additional mailing offices. Postmaster: Please send address changes in New York City to Aviation Week, 1200 15th St., N.W., Washington 5, D.C. Outside New York City, send changes to National Aeronautics Association, Inc., 1200 15th St., N.W., Washington 5, D.C. Single copies 10¢. Subscription price \$3.00 per year in advance. Payment in advance. All subscriptions outside the United States add \$1.00 per year. Claims for missing issues will be considered only if received within 90 days of date of mailing. No refund on unexpired subscriptions. Second-class postage paid at New York, N.Y., and at additional mailing offices. Postmaster: Please send address changes in New York City to Aviation Week, 1200 15th St., N.W., Washington 5, D.C. Outside New York City, send changes to National Aeronautics Association, Inc., 1200 15th St., N.W., Washington 5, D.C. Single copies 10¢. Subscription price \$3.00 per year in advance. Payment in advance. All subscriptions outside the United States add \$1.00 per year. Claims for missing issues will be considered only if received within 90 days of date of mailing. No refund on unexpired subscriptions.

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This new AIRESEARCH gas turbine compressor (GTCS) will start the latest 10,000 lb. thrust jet engines within seconds.

Mounted on a Jeep for easy transport, it is shown starting one of the latest U. S. interceptors, the Convair F-102.

The AIRESEARCH GTCS has fully automatic controls. In two stages, one primer in large free—even from full

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In addition in starting power, the AIRESEARCH GTCS can supply power and heat for ground refrigeration, ice removal, cabin preheat and for ground heating of ram air turbines.

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Domestic

Nine 10 agents could be needed by experimental tests at the aerospace research track at the Naval Ordnance Test Station, Azusa, Calif., were estimated to its full proposed length of 11 mi., as personnel at the facility, present length of 4.1 mi. is designed for speeds up to Mach 3.5.

Fast ejector engine to win Civil Aeronautics Administration certification is Baker-Hughes' BHJLR, designed by the Phil Allen, Calif., company for jet-wing aircraft. The 45-lb. power plant also is the first engine approved for top operating on capacitor valve blades.

F-50D flight simulator has been developed by Robert MacIntyre Co., Pleasanton, and Air Research and Development Co. as a first priority trainer for USAF.

"Substantial interest" in Margardt Aero-Hi Co., Van Nuys, Calif., has been acquired by Glen Matthews Chemical Corp. through an arrangement with Lawrence S. Kuchel and Associates, a principal Margardt stockholder.

North American F-16s were grounded last week at the USAF gunnery school at Nellis AFB, Las Vegas, Nev., after two of the jet fighters crashed on the same day. One of the crashes involved an F-16H, the other an F-16B.

Air Commodore G. D. Stephenson, 41, commander of Britain's Royal Air Force Coastal Fighter Establishment, was killed last week in an F-100 crash at Eglin AFB, Fla.

Lightplane builders shipped 232 units and executive planes valued at \$4,525,000 during September, breaking the total for the first nine months of 1984 to 2,553 at \$12,257,000. Aircraft Industries Assn. reports.

Fiberglass business planes are being built by Textron at its Canyon, Pa., plant, says an estimated and on the market in three to four weeks. The Reach Wagon, powered by a 225-hp Continental, will carry a pair of seats for about \$9,000. The Skyhawk, with a 145-hp Continental, is estimated at \$6,000.

Financial

Beech Aircraft Co., Seattle, reports net earnings of \$2,279,384, sales totaling \$791,513,236 for the first nine months of 1984, compared with a net



Smokeless Rate 'Kicks' Neptune Bomber Aloft

Steady flows blast from the four Rate bottles on the rocketed side of this Navy Lockheed P3V-7 Neptune patrol bomber as it makes a steep, smokeless takeoff from the small island of Andersen Air Force Base. The performance was given at Fanning River NAS, Md., where a training exercise was made of the new propulsion.

of \$13,576,164 and \$616,363,338 in sales for the same period of last year. The company has declared a regular quarterly dividend of 78 cents plus a \$21 cent special, payable Dec. 18 to stockholders of record Nov. 19.

Lockheed Aircraft Corp., Bethesda, Md., had second earnings of \$13,543,000 for the first three quarters of 1984, up 35% from the same period a year ago and \$1,681,900 higher than 1983's total. Sales climbed to a new high of \$181,625,000, compared with \$179,251,000 for last year's first nine months. Booked Oct. 31, \$1,018,862,000, dropping \$480 million from mid-year.

United Aircraft Corp., East Hartford, Conn., reports a net income of \$16,894,894 for the first nine months of the year from shipments of \$487,494,036. This compares with a net of \$15,875,870 and \$179,601,870 in sales for the same period of 1983. Booked Sept. 10, \$1,223 million, an increase of \$300 million since June 30.

Republic Aviation Corp., Farmingdale, N. Y., reported its book loss, \$910 million in approximately \$1 billion during the third quarter of the year. Net earnings for the first nine months totaled \$6,367,015 from sales of \$225,834,526, compared with a \$6,105,199 net and \$186,119,201 in sales for the same period of 1983. The company has declared a semi-annual dividend of \$1 plus 10% in stock, payable Dec. 17 to holders of record Nov. 24.

Chance Vought Aircraft, Inc., Dallas, had a net income of \$5,114,737 for the first nine months of 1984 from sales

totaling \$111,671,501. Booked Sept. 10, approximately \$248 million, a drop of about \$35 million from last year.

Finchelli Engine & Airplane Corp., Hagerstown, Md., reports earnings of \$1,155,000 for the nine months ended Sept. 30, compared with \$1,446,000 for the first three quarters of 1983. Sales dropped to \$102,750,000 from \$118,574,000. Finchelli will pay a 25-cent dividend on common stock Dec. 1 to holders of record Nov. 15.

Bell Aircraft Corp., Buffalo, N. Y., has split its stock, two-for-one, will pay a dividend of 75 cents on each share Dec. 29 to holders of record Nov. 30.

International

Canadian aircraft builders are nearing a production program of at least eight years, with the government as their principal customer, the Air Industries & Transport Assn. of Canada reported last week at its annual meeting at Quebec City.

Canada's Sabre 6 saw a resumption of production last at the company's Montreal plant. The latest jet fighter, built under license from North American Aviation, is powered by a new, more powerful Orenda engine than its previous model.

Language version of a Canberra bomber has made the first Royal Air Force jet explosion at the North Pole—being 3,025 mi. away from a Norwegian base, reaching an altitude of more than 52,000 ft. and encountering a maximum temperature of about 75F.

INDUSTRY OBSERVER

Two British firms are developing rocket-powered interceptors in private contracts. They are A. V. Roe at Manchester and Saunders-Roe at Canby. These interceptors will use rocket power for climb and coast and return on turbojets. Royal Air Force and British Ministry of Supply are evaluating the two concepts in these projects that they showed for the Tolland Great lightweight interceptors.

USAF decision on the future production of the Convair F-102 delta all-weather interceptor will hinge on flight tests scheduled next month at Edwards AFB, when this fighter is scheduled to reach Mach 3.2. Current F-102 speed peak is Mach .95 using afterburners on its Pratt & Whitney Aircraft J7 turbojet.

General Dynamics S2F anti-submarine planes are undergoing a modification program involving 40 tests aimed at reducing tail vibration problems and making the plane suitable for carrier cruises aboard carrier decks. S2Fs on service with the Pacific Fleet have completed their modifications at the Navy's Litchfield Park, Ariz., facility. Atlantic Fleet planes now are going through modifications at Navy's Quincey Pt., R. I., ship.

USAF now is checking out pilots on supersonic flight at Edwards AFB in the Bell Aircraft X-1B research aircraft, a series ship of the X-1A that has reached Mach 2.5 and an altitude over 90,000 ft. X-1A is back at the Bell plant for modification of a specially designed oxygen suit. Meanwhile, Bell X-2 studies steel research aircraft is undergoing ground running at the Curtiss-Wright 12,000-hp diesel turbojet engine propellers to flight testing.

Glen L. Martin Co. has a new Navy missile contract for development of the Bullup, an air-to-surface missile designated NASM-7.

Navy's Bureau of Aeronautics is experimenting with both the British firelock and the French dual loading methods of its Fubert River, Mid-Ten Center. Current records was awarded a contract for operational studies of the firelock rocket motor loading system.

Glen L. Martin Co. has received a new USAF contract for 57 B-61A Modulus air-to-surface missiles. Value \$5,134,511.

Douglas DC-7B is now at the company's Tucson, Ariz., facility for vibration tests. Douglas plans to use the former Constellation modification studies at Tucson for modification program for B-66-type aircraft.

General Electric's J79 turbojet is being considered for installation in the Lockheed F-104 supersonic day superior fighter. Negotiations are under way for a small quantity of 79s, which feature a variable stator compressor, for the F-104 program.

Convair is joining the panels of VTO design using jet power. San Diego division has a jet-powered VTO in the design stage and has studied rocket power application for VTO fighters.

Curtis-Wright Corp. has been studying the application of ducted turbo-prop to current Lockheed Constellation and Douglas DC-7 airplanes for refuel transport operations. Curtis concludes that turbo-prop now available could be operated successfully at lower power ratings at about the same low rate of fuel consumption and would provide a much faster climb and cruise speed.

Arac is experimenting with a helicopter landing vehicle to clear mine fields in the path of advancing infantry. This is an adaptation of the Navy helicopter mine-sweeping technique.

Helicopter dual role target for high altitude jet-fighter primary evaluation has been developed by the Naval Ordnance Test Station, Inglewood, Calif. Fleak-ops (jet) jet aircraft pulls up the 2,800 ft. refuel vehicle and then by the target-launch method.

WHO'S WHERE

In the Front Office

House Book, former manager of Pro American World Airways' Atlantic Division, has been elected a vice president of New York Airways.

Vicente H. L. DeBorja will move up to KLM Royal Dutch Airlines Feb. 1 from vice president in charge of the Western Traffic Group to managing director of the West Indies Division, according to M. Kofas, who will resign.

Ronald D. Gaudier is new president and member of the board of Alky Pacific Carriage Co., Cleveland.

James F. Tinsley, controller for Canadian Ltd., Montreal, has been elected a vice president. Also promoted John Usher, acting secretary and treasurer.

F. Douglas Rodkin, former senior vice president manager for Walter Kille & Co., has been appointed a vice president of Electronic Corporation of America's Party Division, Boston, Mass.

R. V. Cullen, vice president operations of Round International Airways, and W. W. Finkelman, independent Director of said, are new members of the airline's board.

Changes

C. Hart Miller, former president of Potomac Helicopter Corp., has joined Northrup Aircraft, Inc., Hawthorne, Calif., as assistant vice president John W. Morris. R. M. Randall has become general manager, Northrup Aircraft, Inc., Hawthorne. C. D. Marshall has been appointed general manager of the aircraft section of the Boeing Aircraft Corp.'s Production Division, South Bend, Ind. W. L. Webb is general manager of the missile section.

Raffi A. Petrosino, former public relations director for Pan American Latin Airways, has joined McCann Erickson, Inc., New York, to handle the agency's new Vietnam Airlines, Ltd., account.

John A. Davis has been promoted by Maryland Aircraft Co., Van Nuys, Calif., to director of long-range planning and research programs. Other promotions: John S. Waters, chief engine repairman; Hugh S. Lewis, chief engine and facilities; John S. Lewis, manufacturing director.

Thomas F. Lockwood is now engineering and sales manager for Delta Aero Service, Dallas.

Dr. Basil M. Witham, former chief research research specialist for North American Aircraft, has been appointed chief engineer of Magnetic Research Corp., El Segundo, Calif.

Honors and Elections

N. E. Rose, technical director of Blackburn & General Aircraft, Ltd., will receive the 1955-56 president of British Royal Aeronautical Society.

Wesley Oliver Billy E. Wooten has been named a nonresident director for Gary Matthews Refueling, Army chief of staff, for service a 195,000-gal. helicopter speed record in a Sikorski HO4S (Aviation Week Sept. 5 p. 16).



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The New U.S. Air Force—Roger Lewis Outlines Policy . . .

USAF Buying Test: Proved Performance

- Material Secretary asks for big technical jumps.
- Aircraft industry faces tougher competition.

By Robert Hays

As France is looking for rapid new technical developments and aircraft industry management will continue to push them hard during the next phase of USAF procurement, Roger Lewis, Assistant USAF Secretary for Material, told AVIATION WEEK in an interview. Tougher competition for USAF business, acute emphasis on proved performance of new equipment before large orders are placed, tighter contracting procedures and heavier emphasis on individual aircraft than past performance in evaluating them before procurement awards also are among the trends in USAF industry relations according to Lewis.

► **War is Supremacy**—"We are not in sight of the end of the USAF armory building stage," Lewis said. "And we are going to be faced with a new and perhaps more important problem, the costs, delays and uncertainties of our weapons systems in a time of fluid and rapidly changing world technology, coincident with a determined and successful effort on the part of the Soviet Union to run out the margin of our technical superiority."

Lewis said the following points would be emphasized during the next phase of USAF procurement: need at the maintenance of both numerical strength and a significant margin of technical superiority.

► **Large and rapid technical advances**—USAF no longer can afford to lay small technical improvements or modifications on new equipment. It must shoot for big and rapid technological improvements and be going forward in methods of cutting down overall development cycles on new equipment to stay ahead of its foreign competitors.

► **Tougher industry competition**—Lewis warned that the days of "bidding over" things from overseas, as in the Korean crisis program, definitely are over. USAF will buy only products whose performance has been proved superior in actual

demonstrations rather than in fancy sales brochures.

► **Tighter contracting procedures**—Lewis said follow on contracts for equipment already in production had been carefully scheduled throughout fiscal 1955 to be placed at the earliest time they are needed in order to assure proper lead time. The sell price industry and USAF must come to recognize firm and clear contracts for these orders with much greater detail on what is required from both buyer and seller.

► **Trend is toward more fixed-price contracts**, with one-plus fixed fee contracts being favored for research and development work. Letters of intent still will be used when agencies do not yet have enough studies to get new projects under way but now are being used sparingly.

► **Weapons system development**—"We are in the worst weapons business," Lewis said, "and the sphere between development and production is an absolute void." He indicated USAF had begun solving all the problems between prime contractor, sub-system developer and equipment producer and would exercise more control over these relations than organizations previously.

► **Industry management performance**—USAF has been screening its existing procurement programs for 11 months

USAF Procurement Phases

through, modernize its equipment and stimulate technical development all at once. The plan was to rely on a strong and productive aircraft industry supported by an adequate research and development program.

Third phase, to begin shortly, involves maintaining USAF inventory through a significant margin of technical superiority over the Russian air force.

This phase will require the support of an aircraft industry smaller than the post-Korea peak but more than the size of the pre-Korean industry. It must be backed by a continuing growth program and development program and a new type of industrial mobilization base.

Since USAF was expanded in 1947, it has spent \$65 billion—the equivalent of a \$1,000 contribution from every family in the United States.

evaluating actual performance of aircraft and equipment, manufacturers report their personnel performance. A management "character" factor based on this evaluation will guide future USAF procurement awards and evaluations of competitive proposals.

► **Delivery of combat-ready equipment**—USAF no longer can afford to build large quantities of aircraft from combat units for retroactive modifications or to proceed there in lack of combat equipment. USAF will be more critical of industry on weapons release schedule reviews.

► **Dynamic industrial mobilization**—The dynamic concepts of industrial mobilization used for World War II in Korea are outmoded by current requirements for a system that will provide equipment for both a short intense strike war and longer longer wars of longer duration. USAF lately has tackled the critical problem, but it is recognized that a dynamic type of mobilization planning—subject to constant revision in light of technical change—is necessary to replace present concepts.

Lewis told AVIATION WEEK that USAF faces three principal problems as it begins shifting from the inventory buildup phase of procurement to the maintenance of air superiority for the foreseeable future.



1. Maintaining USAF combat units in a high degree of combat readiness for an indefinite period of time into the future.

2. Developing a technologically and financially sound equipment replacement program for a USAF inventory that will avoid future obsolescence.

3. Promoting industrial mobilization programs to meet the new problems of atomic war.

Combat-Ready Force

"The Air Force we now have must be maintained in an extremely high and continuous state of combat readiness," Levin said. "That is quite different from the way we maintained our resources before World War II and Korea, and it more correctly is a response to some condition of industry which would imply we don't put ourselves off of service to incorporate modifications or serve we aren't more effectiveness in depending on a new pace of equipment delivery it is actually tested and demonstrated ready for combat units."

"The fact is we are no longer put large numbers of aircraft out of combat units for modifications programs because it would have critical gaps in our combat-ready Air Force inventory," Levin said. "We will continue to make 'state-of-the-art' adjustments into combat aircraft types to permit their useful life as first-line planes, but this will have to be done in an industry well-planned program that will consider the normal maintenance cycle and not disrupt the fighting strength of combat units."

"An airplane on the ground because it lacks spare parts or electronic gear is not operationally available. It is a fact that a large portion of the aircraft that is available because of technical problems is just as much a loss to the Air Force as it is when that down in combat. We are going to be increasingly critical of weapons readiness in our relations with the industry that supplies us."

"The reliability and degree to which industry supports its products are taking that planes, airplanes, the auto, the truck and the plane parts and will increasingly dominate the thinking of our procurement specialists."

◆ **Long-Range Defense**—Levin said the job of improving the concept of equipment replacement into USAF procurement and operations planning now contributes a major effort of national personnel.

"We must have an orderly and rapid equipment replacement program," Levin said. "Reducing the cost of the most important contributions President Eisenhower has made to date is his firm establishment of the 'age of parts' concept and the policy of looking on defense in sufficient strength for a long pull rather than to seek an immediate



LEVIN: Shout for big and fast guns

cess. Without this concept we would have had an absolute Air Force in a few years."

"Despite the rapid and spreading technological progress already seen for the future, it is possible to predict and plan on the retention of these development units to enable business and their investments into the USAF weapons inventory. Some of these developmental systems are long and we must plan it into given time for a degree of improvement that for the absolute necessity of keeping the quality of our weapon system at their maximum in performance and mobility is such that we have no alternative but to devote the best minds of science, industry and the military to this job."

◆ **Russian Competition**—Levin again said that the competition from Russia as that technological race had never been stronger.

He said USAF would have to speed its study on weapons technology approaches to weapon systems and in looking for industry management with the courage to tackle these absolutely tough development problems rather than persisting what has been a naive concern of producing standard

production items with minor improvement.

He predicted that major USAF weapon system procurement will go to the strong industrial complex and not to the firms combining technical skill with competent management.

Mobilization Philosophy

On industrial mobilization Levin said: "The language airplane and thermocouple weapons have raised the possibility of a short, big war but have not removed the possibility of either long or conflict war. As a result of our efforts in the past few years we have a great industrial structure for the production of current types of aircraft engines and equipment. But like the airplanes themselves, these structures have a tendency to get out of hand if they are not looked after."

"We now have the problem of making certain we have an industrial structure which is not only responsive to our needs in the type of parts but our which is at the same time convenient to meet properly and with the kinds of weapons required at the moment of crisis."

"Not only must we learn that structure that the size and the state of health we need but we must also be sure that its composition will change with our developing technology, that new products and industries are well coordinated and that the old and outmoded are replaced."

"It is identifiable a difficult problem and so are just beginning to study come to grips with it."

"One aspect of the mobilization issue which we feel is particularly important is that all dispersed at will in the vicinity of the country that our industrial resources are distributed as much as possible across the country."

New Competition

Levin warned the industry that tougher competition for USAF business lies ahead and voiced his belief that this will produce better aerial weapon systems and that it is increasingly clear that the crash type program of "keeping everything else everybody."

"The peace treaty of the United States, as the spiritual and conscience leader of the nation endorsed in western civilization, spring from our personal freedom, our free enterprise and competitive system," Levin said. "It is those things that permit us to make the most of the great scientific and technical society of our age and give us the new industrial requirements to meet the challenge of aggression."

"If we are to make the most of these assets, the commitment of public funds for support must be based on policies

of competition, opportunity and firmness which under the most of these. Under certain conditions only in the buildup to World War II and the Korean crash program, it is necessary to buy everything from everybody. For even though these may be desirable about our ability to do that or put that in place at all the price possible, it is most important to get the most that is required."

But this should not be our standard operating policy once we have the need and type of weapons appearing on the field we must have. Desirable as such crash programs may be under certain circumstances, even beyond them they are useless and destructive to the freedom and competitiveness which is our price of survival."

◆ **Early Thinking**—He noted three types of industrial thinking that are acceptable:

◆ **Understanding**, there is already a tendency in some places to consider that as the basis of pure law there is an obligation on the part of the government to buy whether the product is useful or not.

◆ **Usually there is a tendency** in some places toward abstraction and to place a value on a failure to remember that under our system it is often harder to do so than to get there.

◆ **In other places there is a tendency** to see industry as a factor to consider in the great broadening and acceleration of our industrial base—tendency to feel that short improvements and to change old lines will keep us superior.

"There is probably no single area of our industry which is all the parts of the resources of the West can be translated into weapons without either loss of one of its components for material in the Air Force or conversion that could serve certain war centers along the application of combined. American examples is the best system yet devised."

CAA Orders Changes On Connie Engines

Civil Aeronautics Administration has ordered modifications to all Lockheed Constellation engine installations to increase fire resistance.

The action follows a recent engine fire on a TWA World Aircraft Constellation during takeoff from Washington National Airport. The aeronautics department outlines changes to be made on C-46, C-54, C-57 and C-59 transports.

◆ **Flexible hose** is the propeller feathering line between the pump and the governor must be replaced with hose assemblies meeting recent fire test requirements.

◆ **Steel plates** must be installed over the lower engine cowling between ship case to the Zone 1 fire and explosion

RAE Doubtful on Comet Fuselage

ARB witness says his organization settled for lower proof test requirements than suggested by RAE.

London—Testimony of three technicians last week highlighted the controversy inquiry into the cause of loss of the British Comet crashes earlier this year.

◆ **Walter Fre**, chief technical officer for the Air Registration Board, said RAE settled for a less stringent requirement for the design of pressurized cabins than had been suggested by the Royal Aircraft Establishment.

◆ **Dr. B. W. Walker**, head of aircraft structures at RAE, was quoted in the London Times as saying that at the base of a failure after 9,000 lb—the Comet fuselage was not worth fighting at.

◆ **Bruce Johnson**, with long experience in the field of glass laminated structures, advanced a theory that extreme temperature changes may have caused the Comet fuselage to crack under stress. He also questioned the control of RAE's engineering process to assure the development of glass laminated structures.

◆ **Proof Tests**—Levin and an ARB witness were held in 1959 to consider loss of communication in high-altitude crashes and the resulting modest effects. At the time, RAE suggested a fuselage proof test to have the operating pressure and a design ultimate factor of 2.3. ARB settled on a proof test of 1.3.

Big Viscount

A "stretched" Viscount, grossing about 120,000 lb, and powered by new Rolls-Royce RB 191 turbojets in the 4,000-hp class, is in the drawing boards at Vickers-Armstrongs, Glasgow. R. McGee, president of Trans-Canada Air Lines, said. The current Viscount grossed about 60,000 lb.

◆ **Industry**—He said that the transport's weight will be lighter by 10,000 lb, will cost about three pounds less to "grow" during the year, McGee said. The RB 191, set on the test stand, is a "stretched" form, RB-Rolls-Royce Air Limited.

McGee also reports that RCA is not installing carburetors in its Viscounts, although the carburetor wiring is fitted in event the carburetor is removed in the future.

◆ **Flexible joints** in the propeller feathering line between the pump and the governor must be replaced with hose assemblies meeting recent fire test requirements.

◆ **Steel plates** must be installed over the lower engine cowling between ship case to the Zone 1 fire and explosion

tests the working pressure with a design ultimate factor of 2.3.

◆ **Tests**—The added that a proposed test was conducted in June 1953 for tests at 1.25 times working pressure with 15,000 cycles of repeated loads. It is proposed there was a note that designers might have to design to an ultimate factor of three to guarantee the aircraft would stand repeated load tests.

◆ **It was ARB's opinion** that most aircraft of the post-war type, and could be subjected to test, until the RAE tests were made. Tve said. There was more concern with wing fatigue and the static strength of wing box, plastic parts and the metal fuselage. In October 1950 and 1952, ARB began to suspect that passengers could be in general not passing to meet specific requirements.

◆ **Comet Tests**—They were not as usual. The first test was the Comet, and the second, Comet 1. The second Comet 1 test at the Royal Aircraft Board showed that no stress on the Comet exceeded 50% of the ultimate. This corresponded to an average life of 18,000 pressurizations or 28,000 flight hours. Evidently there would give a minimum safe life of 10,000 hours.

◆ **Then after the Elba crash**, passenger tests was considered as an initial cause of the crash. It was the result of the stress calculations. Subsequent inspection of all RB 191 jet transports and a total of 54,000 lb of repeated load tests on a Comet was carried out. The ARB was not satisfied with the results of the tests.

◆ **It was** the results would report less directly in determination of the complete, loadings around wings than between the 40% to 50% that DOL celebrated and the 70% that RAE had calculated. But he mentioned that calculating stress in a plane sheet is only the first step in a more complicated problem is complex and very very in how to treat the calculations.

◆ **Test Procedures**—Under circumstances by a representative of ARB, Walker and no failure occurred in the previous tests from before the experience of 9,000 flight hours.

◆ **If there had never been** as Elba as Naples accident but only the RAE tests, he added, RAE test not have agreed to let the planes fly longer than the requirements 2,700 lb accumulated on the Naples Comet.

◆ **As a result of that** tests we should have reported the Elba crash as del-

which is designed and the Nucleon aircraft as a design or better, now is it?" the Times quoted Walker as saying.

He was asked what he would estimate as the maximum safe life for a Comet jet engine based on the 3,000-hr level of failure in the tests.

"I should not have thought it was worth flying at all," Walker replied.

► **Reflex Questions**—Although previous testimony had given Redux assemblies a clean bill of health, some pertinent questions were raised by Dennis Williams, of John Procter, based on his long experience with laminated-glass structures.

Williams presently was concerned with the effects of entrance and exit temperature changes on the structure. Redux bonds, in a rapid climb, he said, there is considerable differential temperature between inside structure and outside air. Then could some stress cracks relative to the fuselage design? Williams had the test results to show.

He also noted that under high temperature conditions—in high at 212 F on an aircraft standing on the ground in the temperate climate state of the industry and the conventional loads imposed by landing gear might combine to cause small separations. Subsequent changes in loading and differential tire rotations would exacerbate these.

► **Increased Strength**—Williams was also moved by several of the comments. This pointed out that 47 aircraft are Redux loaded. They said Comets flew more than 36,000 cumulative hours with only one Redux trouble noted to get better, Williams said.

They also said the peeling strength of Redux increases at temperatures over up to 144F. They said the Comet door stronger bond was designed for 450 psi, and that the Redux joints in three tests has a shear strength of 3,000 psi.

► **Brutal Accidents**—Six fatigue tests with Redux were cited. The tests showed 110 fatigue cracks and finally cracked at a metal part. The RAE showed temperature differential between that and stresses and found it to be only about 20F.

► **Hanging Fire**—Not some of fully air's equipment assumed partial or unanswered, in the opinion of a technician observing the engine. These points were hanging fire.

► **Worn the outboard temperature differential** the outboard during climb, as a steady-state condition at altitude?

► **Brutal tests**—Brutal tests consider rapid temperature changes?

► **How rapidly does Redux strength fall off over 144F?**

► **Is the use of insulator honey for all Comets a failure?**

► **Would a design of right to have strength needed for the shear stress** constraints be noticeable in progressive deterioration of the bond?



SIR RUSSELL, Conservative critic



SIR FERGUSON, "Delusion before recovery"

Democrats to Hit GOP Air Policies

Switch in control of Congress may mean effort to restore transport wings, boost missile contracts, fight subsidies.

By Katherine Johnson

Democratic control of the House and Senate will bring investigation and challenges of the Republican Administration's military and civil aviation programs next year. This is what to expect. Democrats will want to know the reasons for the sharp drop in contract lettings by the Defense Department just before the election. Democratic campaign criticism of the large volume of contracts let to General Motors Corp. aircraft arm is to be moved.

► **Democratic opposition to the armed forces** grant act by the Administration will focus on the reduction in Army strength and of air force wings to transport land troops. Congress may vote money to increase their forces to meet "real" suggestions.

Another criticism of the support program will be that the Administration has not pushed development and production of planes and guided missiles, has been too slow on contract lettings, that Democrats can do no more than bring additional pressure for a pushup.

► **Spending cuts for military aircraft** programs, largely developed by Congress but two or more years ago, is not affected by the election. The Administration has sustained a high spending rate. If it should decide to hold it down by production standards, Democrats can only protest.

► **Airline subsidies** face even stronger opposition—in the appropriations committee—than they looked in this year's Republican Congress. The odds are, however, that ultimately Civil Aeronautics Board will obtain what it wants upon.

► **Administration's air transport policy recommendations**, now being drawn by the Cabinet Committee on Transport Policy and Organization, seems to have little chance of being implemented.

► **The Lincolnton-Warrenton** and issues in the election will give Democrats in aviation.

► **Sen. Homer Ferguson**, whose district in Michigan by a political analysis, Patrick McNamara, was a surprise. An chairman of the Appropriations Subcommittee on Armed Services, Ferguson was Defense Secretary Charles E. Wilson's standing ally in Capitol Hill.

He led to support of Wilson's \$5-billion slash in Air Force funds last year.

► **Sen. Everett McKinster Dirksen**, administration's other top congressional spokesman on defense, was in Minnesota. He is chairman of the Armed Services Committee.

► **Sen. Joseph R. McCarthy's** election in Wyoming returns to the Senate a strong, vigorous supporter of strategic aerospace. He had served 19 years and was chairman of the Appropriations Subcommittee on Armed Services at the time of his defeat in 1952. Since then he has been counsel for North American Aviation.

Democratic control of the House is certain. Democrats, 331, Republicans, 233. Senate control is in doubt that it likely to be questionable for several weeks. The House now appears to be Democratic, 49 (including Independent Sen. Warren Magnuson), Republicans, 47.

► **Key Men**—There are the men slated to hold key positions on aviation next year.

► **Sen. Richard Russell**, chairman of the Senate Armed Services Committee,



SIR PRIEST, Civil air student



SIR MAGNUSSON, Chooses outboard for

He is a conservative critic of some of the Administration's defense policies, including last year's cutback in USAF funds and postponement of the budget.

The most spectacular challenges of Administration defense policies are likely to come from other Democratic congressional leaders, for instance, subcommittee chairmen, such as Sen. Stuart Symington and Henry Jackson.

► **Rep. Carl Vinson**, chairman of the House Armed Services Committee. Well known for his political effectiveness in promoting strong Naval and air arms. Vinson will stand as a "defense force advocate" program.

He sponsored the opposition to the Truman Administration's cutback in the 72-group USAF program in the late 1940s, working with Symington (then Secretary of the Air Force) and Senate Majority Leader Lyndon Johnson. He led last year's unsuccessful House move to criticize USAF funds slipped by the Republican Administration.

These will be spots for at least two Democratic newcomers on the committee.

► **Sen. Warren Magnuson**, chairman of the Senate Interests and Foreign Relations Committee. Magnuson has been firm and outspoken in his congressional aviation matters opposition to the "single instrument" policy. Magnuson also is on the Appropriations subcommittee that controls the pure strategy for CAA and Civil Aeronautics Board.

He sponsored Joseph Adams for CAB membership.

There will be two Democratic spots to be filled on the Commerce Committee.

One Republican member, probably Sen. Frederick Byrd, is destined to lose his seat.

► **Rep. Fritz Prent**, chairman of the House Interstate and Foreign Commerce Committee. Formerly an aviation writer for the Nashville Tennessean, Prent has taken an active interest

in the development of civil aviation in general.

Demostrats will have at least seven members on the committee for new members.

► **Sen. Dennis Chavez**, the longest in the chairmanship of the Appropriations Subcommittee on the Armed Services. He takes his seat next up to use or derive money matters. He won the post.

Under the seniority system, Sen. Carl Hayden at Sen. Richard Russell could claim it. But Hayden is expected to begin it in favor of chairmanship of the Subcommittee on Interstate Department Funds and Russell in favor of chairmanship of the Subcommittee on Agriculture Funds.

► **Rep. George Mahon** returns as chairman of the House Appropriations Subcommittee on Armed Services, a post he has filled in past Democratic Congresses. He led last year's unsuccessful House move to criticize USAF funds slipped by the Republican Administration.

► **Sen. Harley Kilgore**, critic of airline subsidies, will be the key man and probably the chairman of the Senate Appropriations Subcommittee on Commerce, which controls CAA and CAB funds.

That summer he supported 540 million in finance in his industry program, but not Kilgore. But at the time he said he wanted less information on subcommittee airlines before voting funds for the February-July period. He notes data on expense accounts, personnel to legal, advertising, and other outside firms and an subsidiaries such as hotels, which might be financed with subsidy.

► **Rep. John Rosten**, with a long record of voting for studies in civil aviation funds, will open before the House Appropriations Subcommittee on Commerce.

This year, over Republican protests,

he led two attempts to cut back the 1950 airline subsidy program without adding to \$25 million to \$50 million below CAA's request for \$75 million. Rosten is the first subcommittee CAB will confront in meeting subcommittee study money only in January.

► **Sen. John Stennis**, after a lengthy influential experience on Capitol Hill, will be back as chairman of the special Senate Small Business Committee.

Bendix to Produce British Decca Navaid

Pacific Division of Bendix Avionics Corp. has acquired the U.S. rights to produce and sales rights to the British Decca navigation system, frequently mentioned as a likely award for help costs aircraft.

The low-frequency Decca Navigator provides low-altitude coverage without being so easily equated in present VHF navigation, an important consideration for low-flying combat.

Bendix Pacific will reorganize Decca to U.S. standards and plans to build the ground stations and the aircraft systems and the flight log that displays aircraft position on a continuously moving map.

► **Copter Tests**—A helicopter version of the Decca Navigator is expected to weigh entered 30 lb., including the plane and instrument position indicator, a Bendix spokesman says.

One such helicopter has been flight tested in England by British Overseas Airways in a simulated instrument landing but has attracted favorable attention from both American and European transport helicopter operators (Aviation Week Oct. 11, p. 100).

Several helicopter operators, including Pan Am, have called the Decca system "promising" (Aviation Week July 12, p. 46).

► **Large Area Coverage**—A Decca installation, consisting of a chain of low-power stations spaced approximately 70 miles apart, reportedly can provide navigation service for a 125,000-sq. mi. area for both enroute and enroute flights.

Developed during the war by Decca Navigator Systems Ltd. of London, the British system was a positive contributor to VOR/DME for an international standard. The Decca system currently is serving the British coastal area and Western Europe, and there are plans to expand it to the Mediterranean area.

A recent report by the Air Coordinating Committee's Air Traffic Committee and Navigation Panel says Decca's low-frequency operation, which also makes it more susceptible to perceptible static as well as to propagation disturbances.



CONQUEST XPY-1 VTO fighter was the star of Navy's show. It gave viewers their first view of how it makes transition from vertical takeoff to normal flight (above) to banking.



DOUGLAS X4B-1 SKYHAWK shows weight savings over its bulkier F-4B predecessor, weighs 46,000 lb., and has 10,000 sq. ft. of wing area. It has been completely redesigned for Skyhawk flight at wing of 40 ft.

Navy Shows Off Newest Aircraft

By William J. Goughlin

Los Angeles—Navy has displayed some of its newest aircraft on a three-day pass tour highlighted by the first public demonstration of Carrier's XPY-1 vertical takeoff fighter in full flight.

Apparatus of new jet, turboprop and VTO aircraft emphasized the modernization of the Navy's air arm now underway.

The exhibition was started by the dynamic major display of Carrier's XPY-1 Sea Dart before 300 spectators, photographers, television and motion cameras (p. 20).

maintained a chance to see Lockheed's XPY-1 vertical takeoff fighter on static display when part of the demonstration was shifted from Edwards AFB to Imperial Naval Air Station at the invitation of USN.

► **Continuing Demonstration**—The one with which test pilot J. E. (Skunk) Coleman just Carrier's new VTO fighter through its full range of maneuvers was a surprising demonstration that the vertical takeoff aircraft is operating a new chapter in aviation.

The flight was the second Coleman had made through the full cycle from vertical to horizontal and return to vertical. First had been only two days earlier during a 21-min. initial test.

After starting the Allison YT40-34 turboprop engine, Coleman tested his controls and then climbed slowly to a height of approximately 50 ft. He moved the "three-page style" display toward the east, then angled down to the runway about 40 ft. from his original altitude point.

► **Vertical to Horizontal**—With this engine climb, Coleman tested the throttle forward again and the straightening fighter lifted off its four wheels, rising from vertical to horizontal as it climbed. By the time the VTO reached an altitude of 175 ft., it was in a horizontal flight attitude and speeding away from the field to the west, its stabilizing tail making a cross against the sky.

Coleman carried steadily south of the field and came over the runway in a low pass above the east at about 250 mph and approximately 30 ft. in the air. His engine was open.

"I was going to slow it down," the test pilot explained.

He made a second pass over the crowd of spectators and spectators, followed by a climbing turn.

► **Horizontal to Vertical**—Coleman then made another approach for his transition from horizontal to vertical flight. Flying toward the field in a slow, nose-high attitude, he began climbing at about 45 mph toward stable altitude and then up into the vertical attitude at about 100 ft.

As in the takeoff, the transition appeared to be made quite easily. Coleman dropped slowly to about 100 ft., moved over toward the runway and moved down to a tailoff landing.

Time for the flight 12 min. Coleman and the VTO is similar to that of a helicopter because it is a "straightforward" aircraft. He said there is a brief period during transition from horizontal to vertical flight when the pilot is disoriented as a result of the change.

Coleman reported there is a point during the takeoff when "when you either have to execute a landing or take a wingoff." Landing stability is good, he said.

Policy Attack

Robert Gross, president of Lockheed Aircraft Corp., assigned someone on the Navy jets line with an attack on the Administration policy of marine reduction.

"I am totally out of sympathy with a policy of marine reduction, which means we have to sit here and take it and then let back if we have anything left," Gross said.

The Lockheed executive said such a policy is extremely harmful to the needs of the U. S.

But as long as such a policy exists, he said, the best of it is only money—"fully earning, business money and absolutely indispensable."

Such a policy requires such tremendous defense expenditure, so enormous amounts of money that it may well be a very money-losing proposition, Gross warned.

The XPY-1 is equipped with an engine test and quick-opening parachute designed to save the pilot in event of low altitude engine failure.

Allison engine in the prop, adapted for vertical flight, generates 3,800 hp, and is geared to a turboprop engine Wright Turboelectric propeller 36 ft. in diameter.

Weight of the aircraft is approximately 15,000 lb.

► **15-Sea**—Fairey's test of the Navy's new aircraft to put on a flight demonstration was the large 54-ton R1T-1 turboprop engine. From the Carrier's engine room on the edge of San Diego Bay, the giant engine trundled down the ramp on its bearing rollers and into the water. It then did out of the cradle for takeoff.

Takoff was the highly loaded R1T-1, powered by four Allison T40 engines, took only 18 sec. Under fully loaded conditions, takeoff is said to require only 30 sec.

On takeoff, the R1T-1, the low-level version of the turboprop engine, can be loaded through a hydraulically operated bow door 5 ft. 4 in. wide and 6 ft. 6 in. high (Aviation Week Sept. 31, p. 17).

The R1T-1 flight was followed by the 15-Sea demonstration of the third member of the Carrier Navy "no man's" weapons system, the Sea Dart.

► **Longest**—Ever—of the Navy's first jet, the Sea Dart, was the first of its kind to be flown by a Sea Dart. It was the first of its kind to be flown by a Sea Dart. It was the first of its kind to be flown by a Sea Dart.

The new order will extend production of the plane into 1957, he said.



TURBOPROP SUPER CONQUE, R1T-1 with P&WA T34 engine, has made 19 flights since Sept. 1. Second of two turboprop R1T-1s has piloted all Lockheed's assembly line.



DOUGLAS X4B-1 SKYHAWK, powered by Westinghouse J46, made two reaching 650 mph passes low over runway at Edwards NAS, then climbed steeply for banking maneuvers.

Johnson and it is "the largest ever placed for Super Constellation-type equipment."

Largest single commercial order ever placed for Super Constellation was by the U. S. Navy. Some of the earlier military orders have been for more than 20 aircraft and this latest order also tops those.

The order provides for a substantial number of early delivery aircraft for both the Navy and Air Force, Johnson said. First order for the new plane was in 1950. Since then, the Navy has placed four orders and the Air Force three. Twice the aircraft were ordered in one order, as in the latest case.

► **Second R1T-1**—On view was the second of the Navy's 40 R1T-1 R1T-1 turboprop Super Constellation, just off the assembly line. The first model is said to be being flight tested (Aviation Week Sept. 31, p. 18).

R1T-1, powered by four Pratt & Whitney Aircraft T34s, has made 19 flights since it first flew Sept. 1 and is undergoing preliminary development work prior to its formal demonstration program for the Navy.

► **Navy Flyer**—At Edwards NAS, pilot

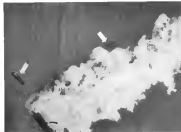
Jay Brinkley and copilot Carl Smith piloted the R1T-1, latest in the Neptune turboprop series, through its pass.

Then came the Douglas AD "Hornet" Hornet, on the first public flight made by the light aircraft. Test pilot Robert Rahn opened his demonstration with an extremely close fly-around flyby and then circled around the field in a 600-mph pass with burner blazing. He concluded a final low-altitude pass with a series of rolls as he climbed away.

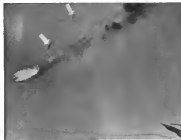
Bill Bridgman took off next in the XPY-1 Skyhawk, powered with the Westinghouse J46. A production model J46 with its P&WA J47 was scheduled for the demonstration but was canceled due to overwork on the engine during preflight ramp.

Bridgman brought the Skyhawk across in a low, extremely close pass and followed with two 650-mph, passes down the runway and a steep climb.

A demonstration of a Mach 1.5 test on Lockheed's supersonic test was followed by rocket firing by AD-4, F3H-2 and F4U-1, and an exhibition of the Chance Vought F7U-3 Corsair with a supersonic dive from 45,000 ft.



SEA BART'S ENGINE (arrow) has lots of burning all sections of new Navy fighters



NOSE SECTION, with hydraulics extended and continuing pilot, left wing down right

Navy to Continue XF2Y Program

Sea, Diego-Navy will continue its development program on Convent's water-based supersonic fighters despite the disaster in which the XF2Y-1 broke up on a water landing and plunged into San Diego Bay in flames.

Navy and Convent divers last week had recovered nearly 95% of the shattered Sea Dart and a joint investigation was under way of the crash that killed its pilot, Clasper Bachhaus.

There was no official loss of the plane for the moment.

Field Flight—The XF2Y-1 made its first flight as part of a three-day pro-

gram intended to demonstrate the latest aircraft in the Navy's growing air arm (see p. 10).

An Bachhaus noted the Sea Dart down the ramp for the demonstration flight, observers noted. But the hydraulics on the second were shorter and heavier than those previously seen on the water-based fighter. Which gave only one for testing was making and the aircraft entered the water side on a crash. Convent figures wearing aqua jumps embarked the cockpit after the plane was in the water.

Bachhaus turned out for a long time

on can, ramping up on the air and dis-
tributing along in a space of water before
what seemed to be a somewhat difficult
pitch.

After reporting several minutes later
by radio that "I'm coming over"—the
last words from the pilot—Bachhaus
reappeared as a high-speed shallow dive
over the bay from the south.

XF2Y-1's Bachhaus-Bachhaus's speed
in the shallow dive appeared to be in
the neighborhood of 650 mph and
detectors were informed. At an altitude
of about 150 ft, the fighter aimed up
sharply for a split instant, hefted, over-
steered twice, doubled and then dove
horizontally as sudden as strength or though
it had hit a wall.

A loud crack accompanied the
breakup but there was no explosion.
A bank of flame that followed the
breakup probably resulted from rupture
of fuel tanks or fuel lines.

Debris tumbled through a wide area as
parts of the aircraft plunged toward the
bay. Wing and tail sections were reported
to hit. A large fuel tank trailing smoke
struck downward.

Largest fragment was the under-
powered forward fuselage that snapped off
just off of the cockpit at the waterline.
With Bachhaus inside, this tumbled
end over end into the water with a
terrific impact. Tumbling motion of
this section apparently snapped the
hydro-disk into the extended position.
The disk was in the extended position
when the fuselage began.

Convent has asked television, newspaper
and still photographers for their respec-
tive to aid in study of the accident.

Swift Rescue—Navy's was a launch
with two Convent fighters aboard. They
plunged into the bay, found the cockpit
within 40 ft of water and brought
the Convent test pilot to the surface in a
rescue that was remarkable for its
swiftness.

Bachhaus died a few minutes later in
the launch.

XF2Y-1 was the second Sea Dart to
undergo flight tests. It was powered by
two Westinghouse J46 engines
equipped with afterburners.

First model of the Sea Dart, the
XF2Y-1, has been modified to a single-
seat configuration. Work also is under-
way on at least two other Sea Darts, as
the work when the Navy ordered its
original contract due to trouble with
the hydro-disk. These are not yet ready
for flight tests.

Carrier News Launching

Navy's first "big" carrier, the USS
Fremont will be launched Dec.
11. The world's largest ship will cost
approximately \$80 million and a comple-
ment of 466 officers and 1,160 crew will
begin its commissioning sometime next
fall.



technical bulletin

a New MOTOR

for hydraulic pump
in a guided missile



SPECIFICATIONS • TYPE D-638

Weight: 22.5 pounds • Maximum Capacity: 4.5 HP
Voltage: 208 A.C. • Amperes: 20 at 6.5 HP • Cycle: 400
Duty cycle: 3.0 seconds at 4.5 HP
15.0 seconds at 1.5 HP
Continuous rating: 0.5 HP at 2300 r.p.m., 15.8 seconds, 200 volts.

EMCO Model D-638 was designed and produced for a
leading turbine manufacturer for use in guided missiles
where greatest power output per pound of weight is
imperative. Specifications called for a 400 cycle A.C.
motor operating at 200 volts, 20 amperes, at 2300 r.p.m.
and a continuous duty cycle of 3.0 seconds at 4.5 HP
and 15.0 seconds at 1.5 HP. EMCO's D-638, weighing
17.5 lbs., met the requirement. It also has a continuous rating
at 5 HP of 2300 r.p.m., at 15.8 amperes. Complies with
U.S.A.F. specification #32550 for 400 cycle
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DESIGNERS AND MANUFACTURERS OF HYDRAULIC AND PNEUMATIC AIRCRAFT EQUIPMENT

Australia's Transport Log

Here is a table of comparative utilization figures taken and by Australia's Department of Civil Aviation this year as a cross-section of that country's activity.

	Hours					
	TNA	ANA	QCA	BCPA	Aerlett	BAF
DC-4		2,840 hr		2,400 hr		
Constellation 740A			2,810 hr			
Cherokee 240	3,000 hr					
DC-6	4,000	5,475	3,140			
DC-1	3,150	3,800			3,325	2,600 hr
DC-3 (Douglas)	2,500	2,210				
Boeing Douglas		7,330				

Australia Expands Civil Aviation

Big market for air transport is growing in development of country's potentially rich but remote Outback area.

Melbourne—Commercial aviation in Australia has boomed tremendously in the last years since the close of World War II, but the future promises even greater expansion of what has always been a lucrative market for American aircraft and equipment.

The Commonwealth now is at a stage of development comparable in modern terms with America at the turn of the century. Integrating are flowing as manufacturing industries are rapidly expanding, road space are maintaining a high level, and mineral resources are being highly developed.

► **Planes for Times**—Much of the buoyant economy and promising future is the need to expand communications in the potentially rich but poorly developed Outback. In this, the airlines often the communication medium that America found in the iron horse of the railroads.

Major plans for this type of expansion include the ambitious but undoubtedly practical air base scheme sponsored by Australian National Airlines, for building stations in the present remote northern Australia and being not expansion, but also other products to coastal harbors or the nearest rail heads. This scheme, under consideration for adoption by the federal government on a long-term subsidy basis, will develop a market for large numbers of big transports.

Australia already spends an average of at least \$50 million a year in America on spare and other equipment for air transport system. Her air transport fleet are predominantly U. S.

Recent capital expenditures include 17 Super Constellation for Qantas Empire Airways, two DC-6s and two DC-4s for Australian National Airways, one Constellation for Aerlett Air

ways, which expects to order another next year, plus a variety of single-engine and biplane and equipment for the Department of Civil Aviation and municipalities and other small special research equipment for the government's Bureau of Mineral Resources and private companies.

► **The Expansion**—Ever since the DC-2 captured the transport section prize in the 1931 Melbourne Continental Air Race and an order from ANA, U. S. aircraft largely have dominated Australia's airlines.

Because of this and the strategically vital commercial ties with America, Australia has had no restrictions on U. S. passenger-carrying than those imposed by dollar finance difficulties. With the growing competition from the United Kingdom industry, that difficulty still is acute.

Any company wishing to enter an equipped line, America first must obtain a permit from the Department of Civil Aviation substantiating that the government is valid both in terms of the airline's need to serve its system and that the type meets DCA safety standards. It also makes an application to the Civil Import Licensing and Commission for the necessary dollar allocation and an export license.

Until recently sales tax was imposed, varying from 52% in 1949 to 124% in 1953. Recently, however, the airlines have been exempted retroactively, as an exemption and to have been worth nearly \$750,000 to ANA.

► **QCA Holds Back**—Single-engine factor in immediate introduction of British technology equipment, however, has accounted part of their operating economy—or retarding their path in Australia's per capita types.

Among the carbon cuts in Qantas

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Field tested Leach Precision Relays like this hermetically-sealed 400 cycle universal relay undergo rugged usage and it is essential that the precision schematic be used in the relay—and Leach has standardized on one method of identification—Metal-Cal—the above is labeling.

Metal-Cal

comes in a variety of sizes—units or duty relays—any size or shape

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admits permanently to any inside surface—but is covered without screws or rivets.

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which now operates to the United Kingdom via the Middle East to South Africa via the Indian Ocean and to North America over the South Pacific route.

Under the terms of its second merger with British Commonwealth Pacific Airways, QEA accepted BCPA's option on two Comet 2s. BCPA also had options to buy four turbo-prop Boeird Britannias. It is doubtful if either will be bought, although strong pressures are being brought to bear upon QEA.

QEA's chairman Sir Hudson Fysh hints that the airline is interested in commercial language jet and turbo-prop equipment but does not regard itself as committed to buy existing British types. The airline will investigate the world market, with 1960 as the latest date to take delivery on turbo-prop and jets.

► **First-Class Competition**—Trans-Australia Airlines, set up in 1946 by a Labor government that had been defeated in the high court on a legislative move to subsidize domestic air transport, has based its pre-emptive policy on passenger attraction in competition with its main privately owned rival, ANA.

TAA bought its Comet 2s and "sold" passengers on successfully but ANA, with its DC-7s and DC-8s, dropped into second place in passenger carriage. Now TAA has taken a further adventurous step by ordering six Viscount Viscounts.

Because of intense competition, ANA was reformed in the Viscount but at the last moment had second thoughts, cancelled its option with Viscount and turned again to Douglas Aircraft Co. To get in first with one competitor, it bought two DC-8s from National Airlines, put them into operation last December and ordered two DC-6Bs from Douglas for delivery in February/March 1955.

In the six months March through August, the influence of the DC-8 purchase has been striking. They carried 150,487 passengers, compared with 271,487 in March/August 1953. At the moment they probably are helping TAA's figures.

► **Big Freight Load**—Whether this passenger growth will continue in the face of Viscount competition is doubtful, but ANA believes better overall economics will be possible with the DC-8s and -6Bs than with the Viscount. In this thinking they include freight carrying capacity and long distance flights over the most lucrative Melbourne/Auckland/Perth route.

ANA carries more freight than all the other Australian airlines put together and more more than 34% of its revenue from this side of its business. In the year ending June 1954, it lifted a total of 38,715,000 lb. Two-thirds of this

AN IMPORTANT MILESTONE

in the Development of Greater Aircraft Safety

Official recognition of more than five years of pioneer work in the development and perfection of Explosion Suppression and Fire Suppression Systems occurred on November 2, 1954, with the issuance of U. S. Patent #2689240 covering the basic work done in the field.

Explosion Suppression is the new protective technology which has been called "a war against aerial blow-ups." It provides protection against the largest single cause of loss of combat aircraft—explosions resulting from the ignition of fuel/air mixtures.

This story goes back prior to 1949 with the original research into the characteristics of explosions conducted at England's Royal Aircraft Establishment by W. G. Glendon and A. M. MacLennan. In 1951 they visited the U. S. under the sponsorship of the British Government to make their invention available to the U. S. aircraft industry, the U. S. Air Force, and CAA officials.

In accordance with a well-established custom, the British Government granted the inventors rights to the development of this device in both aircraft and industrial fields. They, in turn, contracted the development and manufacturing rights of Explosion Suppression to Greater Manufacturing Company, Ltd., of England, of which Simmonds Aeroaccessories, Inc., is the sole U. S. licensee.

As late as 1954—Simmonds, working with U. S. aircraft companies, has successfully assisted Ex-

plosion Suppression Systems on three advanced type U. S. aircraft, the first to be completed.

In operation, Explosion Suppression Systems utilize data originally determined by Glendon and MacLennan—namely, that in any fuel/air explosion there is, in the initial stages, a minute but measurable time lag, during which the strongest combustion can be sensed and/or made relatively harmless.

Rapid diagnosis of an Explosion Suppression System involves a device designed to detect the incipient combustion, which is caused by means of an electrical circuit to initiate those crystals containing suppression fluid. When the crystals sense an incipient explosion, the crystal closes and the suppression fluid, thereby softening fluid and suppressing the combustion. Each system is designed to meet the requirements of a particular installation and may serve to protect against single explosions or multiple explosions. Simmonds offers two types of detectors—a passive visual type detector, and a pressure-rate-of-rise detector, depending on the requirements of the installation.

Simmonds is currently working with the U. S. Air Force, with a group of leading aircraft manufacturers, and with a number of national (non-military) firms in the installation and in the further development and perfection of the important aviation.



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Epox resin 828 and Curing Agent CL retained more than 95% of their initial dry flexural strength. And with Curing Agent CL you can use the "B-strings," or pre-curing, process—permitting dry layups and specialized curing techniques.

Your request will bring you a sample of Epox resin 828 and Curing Agent CL. In evaluation, as well as a copy of Technical Bulletin SC-64-64. Write for them—today.

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*A development of Shell Chemical Industries. Patent applied for.

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highlight it does in passenger aircraft.

Australia alone has been noted for high aircraft obsolescence, but the introduction of larger and higher performance aircraft is already having its effect. ANA, for instance, is getting more than 4,000 hr. per year regularly from its DC-8s and nearly the same figure for their DC-10. The introduction of the DC-10 caused a substantial drop. The expectation is that TAA's obsolescence will similarly be affected by the introduction of the Viscount.

► **Intensive Competition**—Competition in new types is not restricted to the major airline operators.

Qantas Airways, which has built a thriving intrastate semi-coach/freighter service with slightly lower fares than TAA and ANA, said now has moved steadily in the DC-3 field and has just ordered the major operator. Its introduction of the Convair 440, however, has brought a new development to the Australian air transport picture.

Burke Air Transport, with which it competes on routeable routes to New South Wales, has ordered two Viscounts, one of which will be delivered in mid-1975.

Both ANA and TAA have responded by going into active competition in the interstate coach service field, formerly operated exclusively by Qantas.

► **Available Markets**—A major export problem facing all Australia airlines is the search for a DC-3 replacement. At the moment this problem is centered on the Fokker Friendship and the Handley Page HPK3 Herald. If Australian manufacturers can produce a better machine of comparable economics, there is no doubt of the market available to them in this rapidly expanding country.

Another field in which Australia possesses good market openings is civil engineering. As yet there is no local engineering and training firms in operation and most are small and equipped with nothing better than Tiger Marks, although some Corvairs have been ordered recently.

Agribusiness economists point out that Australia offers the maximum area of 147 million acres capable of improvement by hydropping and the construction of soil conservation structures. In addition, many dams and agricultural ports take heavy toll of the country's worth's primary production.

Australia's water resources. New Zealand, already has made tremendous strides in five divisions and the second order for 100 lots of Fletcher FULM ditches for assembly and sale in New Zealand has aroused interest in Australia. There is no doubt that in the future even larger markets will be available in Australia for the sale of the right type of equipment for this work.



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Airport Rivals

- Dallas-Ft. Worth vics for top ranking terminal.
- Cities pressure airlines to capture schedules.

While other areas go begging for adequate airport facilities, Texas is the Dallas-Ft. Worth area will have two of the most modern airfields in the world—within 10 mi. of each other.

One, the \$12-million Greater Ft. Worth International Airport, already is in existence. The other, anticipated Love Field outside Dallas, is about to get its feet lifted in one of the most extensive and expensive modernization programs ever undertaken.

• **Bitar Fight**—The two cities used but one airport, centrally located. Originally, both had agreed to support the Ft. Worth airport (by any other name), since it was felt that its proposed location would serve their mutual interests.

But prior to construction, after much

haggling over administration and control, Dallas pulled out of the deal.

Thus began a bitter fight between the real chambers of commerce, highlighted by Ft. Worth's decision to "go it alone." Private collector was Amos Carter, the city's leading citizen, publisher of the Ft. Worth Star-Telegram and a member of American Airlines board—so much so that the installation originally was to be known as "Amos Carter Field."

Under Carter's leadership, Ft. Worth built what is generally considered the "best word" in airport facilities, expecting to attract the greater portion of the area's airline traffic from outmoded Love Field.

Underseam, Omaha-based Delta immediately started a fund-raising campaign for Love Field underseamers. Greater Ft. Worth International Airport hardly had opened its doors when

The straight realignment, with each city trying to undermine and outdo the other. Pressure was put on the university by Dallas to maintain Love Field schedules and by Ft. Worth to divert schedules to their airport. With Amco Center on its board, American shifted its base of operations to Ft. Worth airport and split its schedules between the two terminals.

When it looked like Dallas' son, the late Tom Brumfi, might do the same with his Brumfi International Airways operations, owners of Dallas quickly proclaimed him the city's "outstanding man of the year."

It even came to the point where some airlines were, and still are, forced to land Delta passengers at Love Field, then take off for the flight of a few minutes to deliver passengers at Ft. Worth airport.

• **High-Paced Pads**—So far, even without modernization, Low Field has been able to maintain the greater portion of its schedules, while Ft. Worth's terminal is operating at less than half its capacity.

Located 17 mi. from both Ft. Worth and Dallas and covering 1,750 acres, Greater Ft. Worth International Airport is one of the outstanding facilities in the country.

It has three good runways. The northwest-southeast main runway is 5,400 ft long and 300 ft wide, with provisions to extend to 12,000 ft. The north-south runway also is 5,400 ft long, but 150 ft wide, while the northeast-southwest is 4,000 ft long and 150 ft wide.

Two passenger loading bridges can handle 17 four-engine aircraft simultaneously or 20 to 21 twin-engine aircraft. There is a heliport on the west side.

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446 *Journal of Management Education*

Steel	Flow	Stress	Strain
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1020	100	100	100
1025	100	100	100
1030	100	100	100
1035	100	100	100
1040	100	100	100
1045	100	100	100
1050	100	100	100
1055	100	100	100
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1065	100	100	100
1070	100	100	100
1075	100	100	100
1080	100	100	100
1085	100	100	100
1090	100	100	100
1095	100	100	100
1100	100	100	100
1105	100	100	100
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1465	100	100	100
1470	100	100	100

AVIATION WEEK, November 15, 1954

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of the terminal building, which can accommodate 12 system simultaneously.

► **Planned safety-driving system.** The airport was designed with all safety, water and gasoline systems underground. There is a noise index of 5-6 in the terminal clear approach to all runways.

It has all of the latest navigational aids—including radar, radio search, instrument landing system, ground control approach, high intensity runway lights and high-intensity taxiway lights on the entrance landing strip.

Driving time to both Dulles and Ft. Worth is approximately the same, 10 min. Two and two make four are the same to both cities.

► **Roads for Growth.**—Containing a present total of approximately 342,000 sq ft, the terminal building is expandable to a total of more than 500,000 sq ft when and if conditions should dictate the need.

For example, ticket counters now occupy 235 linear ft. By removing the south end of the wing and extending outward, 200 additional linear ft can be easily available.

Future expansion of north and south loading aprons is provided by the 1,300 ft mirrored for this purpose. By removing the end of the north-south passenger concourse and connecting it another 450 ft, two more fingers can be added.

► **Soft Vacuo, Sweet Main.**—In the corner of the building, a public address booth is visible through a large picture window.

Women announcements are noted behind a control console with a maze of switches that require only a 6-8-16. All airline and other announcements are made by this one person, eliminating the hectic, rushing voices of many men, behind and cargo agents.

Between announcements, soft music is heard throughout the terminal building.

► **Baggage Speeded-Baggage handling.** long the baggage of air travel, is subdivided at the Ft. Worth passenger terminal.

Average time for baggage to be delivered from the most distant gate area to the delivery station equals 15 to 20 min, 40 sec.

This is accomplished through the use of electric trolleys, selected because of their low maintenance costs and quiet operation, that run directly into runway from railroad plane to the check counter.

► **Expensive Program.**—The Low Field modernization is expected to cost considerably more than the construction of Greater Ft. Worth International Airport. Here are plans for Low Field improvements:

• Lengthening of runways, landing detection of instrument buildings and

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All this for one-fifth the cost of any other existing type of GCA system! Truly the result of creative electronic engineering, SPAR is another product from the Laboratory For Electronics, one of the most respected and fastest growing firms in the field. Famous for its technical personnel expertise, the Laboratory is now turning its talents to the broader needs of industry and business.

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HOLDING MACHINE as general loader now lends itself to joining line conveyor. Worker right grips precision orbital cast bar.



Sperry Sand-Casts to Precision Finish

By Irving Stone

Genet Neck, N. Y.—The old time skills of the loader are being adapted to create tenacious precision aviation components in the shops of the Sperry Gyroscope Co.

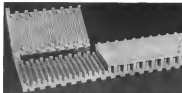
Using a sand-casting technique as fresh to men the exacting demands of modern aviation equipment, Sperry is producing casting precision waveguides in a large range of configurations and sizes for itself and for other aviation manufacturers.

Not only does the process give high finishes and close tolerances, it also gives a considerable saving in cost. Furthermore, as some surfaces these castings are as rough as to rule yet their consistency by fibrous methods.

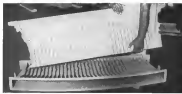
Work Range Extended—Sperry is now extending its casting shop to include work for close tolerance fittings and other parts used in conjunction with radars and missiles. More and more of these parts are being designed for precision castings, Sperry says. For such they were fabricated—first metal pipe involving heating and machined components requiring assembly. This is much the same way that wave guides formerly were fabricated.

Old Foundry, New Skill—Foundry operations, not usually a complementary activity to the manufacture of aviation equipment, has been a part of Sperry's organization since 1914—four years after the company was founded.

Until about three years ago, the



CAST "WARMONICA" antenna lead for language tracking radio partly returned to shore perfid waveguide. Unit is about 50 in. long, 6 in. wide, 2 in. thick.



ANOTHER FEED in same system, softened to show complexity of casting, as flat within 0.01 in. The intricate work, and one above, illustrates difficulty of fabricating part.



POWER DIVIDERS for language work color cast with deep contour (above). Fabricated complete (top, left) for 14 pieces of work and heated flat (right).



TWIST SECTION is heated to close final stage. Casting cuts cost considerably.



WING-FOLDING FITTINGS are precision machined. Machining is eliminated except for drilling. Parts formerly were forged.

FABRICATED "oil cast" (top left) has four machined parts. Unit, top right, has cast ring with flange added at outside.

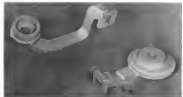
foundry did what is considered "good" sand casting of high quality, when it extended its operation to include "precision" jobs through various refinements in foundry practice and more stringent quality control to keep pace with fast-moving radar development.

For the past year the foundry division has been equipped by Leonard Mallet, a veteran of 37 years in Sperry's engineering and manufacturing activities.

Start Requirements—The waveguide is a prime example of the new precision requirement. In effect this unit is a duct to guide an electromagnetic wave long one part to another.

Surface finish in the waveguide is vital because the depth of the current is only a few thousandths of an inch, hence all the important electrical and mechanical properties of the guide apply to the surface region. The outside of the metal in the guide merely serves as a shell for structural support.

The trend is waveguides at forward greater complexity because of the grow-



CAST SCANNER-JOINT formerly was assembled from tubing and machined parts.

ing requirements for more functions within a smaller space. The precision sand-casting technique fits in with this trend.

Sperry not only turns out production precision parts for itself and other manufacturers, but also is able to supply de-

velopment parts it couldn't get easily from outside suppliers, and in some cases couldn't get at all.

Sperry also has other casting activities—the casting and investment casting—but these are not included in the foundry division because of the differ-



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HARTWELL Triggersmith Flush Latches are produced in over 300 matched combinations of bolt and trigger offsets. We can supply a bolt for any door to be locked in any frame within thickness ranges common to standard sheet metal practice.

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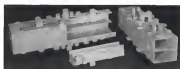


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"PIGGY BACK" variable structure section is cast with numerous holes and pins.

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► **Excellent Choice**—The sand casting technique is reported by Sperry to give these advantages:

- Dense, nonporous castings.
- Accurate internal finish on true parts in a hole to 50 to 180 microns/in. The Muller tap, comparable to a normal machine finish with a very smooth cut.
- Close dimensional tolerances can be maintained over a wide range of sizes from small to large—down about 5 in. to about 5 ft in length. On 1-in.-length dimensions, tolerance can be held to about ± 0.02 in. On lengths between 1 in. and 5 in., tolerance held to about ± 0.05 in. For lengths between 5 in. and 50 in., tolerance maintained to ± 0.01 .

On a 6-ft length, tolerance can be held to ± 0.05 in. Muller reports Sperry is aiming to achieve these tolerances for the general category casting jobs together with a surface finish of about 130 microns/in. in this casting class.

► **Shaping cost** for sand casting, including equipment features, cost found is generally less than for other methods. It is competitive in price with other casting methods and, compared with fabricated parts, the precision sand-casting technique can produce parts far in time at 10% and, on the average, for 20% of the cost, Muller claims.

► **Production Highlights**—Highlights in the pattern sand-casting technique include:

- All cores are made of dry sand, specially processed for business. Bubbled between the fingers, the sand feels as smooth as talcum. Sperry's sand below 100 microns closely all core exact of sand with cereal and resin in tandem. Molds are made of alloy iron sand and green sand.
- Special pattern equipment is used. All core boxes are aluminum alloy core chasers to very close tolerances and have no draft.
- Conventional cores are closely controlled for accurate weight/guide performance. All cores are tapered, surface finish contains are held to very close limits for efficient transmission.
- Heating temperatures are closely controlled.



BRAZING FIXTURE (left) is required for fabricated type bolts (top right) made up of many pieces. Cast unit below it core about one-quarter to scale.



DOUBLE EXPOSURE view shows how cast ends fit together, even after 140-deg heat loads reduce width slightly.



TRANSITION from rectangular to circular section is simply casting job.

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selected to process to assure the same degree of cutting on a piece.

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About 40% of Sperry's business output is for the outside market, about 60% for its own use. About 60% of total output is for the aviation industry.

Most of the wingpiles for airborne work are made of magnesium, some of aluminum. Material for general aviation is usually in aluminum (brass and copper are used where weight is of no great consideration, as in laboratory components).

• **Precision Cutting Examples**—Outstanding examples of parts Sperry is cutting in its precision technique include the following:

• **Wing-folding components** (three) for a German aircraft. The most cutting action is possible to eliminate all air-chamber except drilling. The parts formerly were forged, then machined all over. The cost price is lighter, less costly.

• **Fast fitting for main landing gear** on an advanced fighter. This part, which is used for cutting in the very near future, is a slightly domed, rectangular surface encompassing about 150 sq. in. Thickness is about 0.15 in. Surface finish is to be held to 125 microinches. Material is 2024 aluminum alloy.

• **"Heronian" extreme feed** for large, long-range tracking radar. Part of a missile system, this cost piece includes 42 dimensional wingpile sections having complete walls. Approximately 50 in. long, 8 in. wide and 3 in. thick, the dimensional tolerance for the seat, from one end to the other of the 42 grades, is approximately 0.015 in. It was found that a unit having satisfactory performance could not be produced by fabricating a piece similar to the cost article.

Another extreme feed, part of the same system, is a cutting about 50 in. long, 2 to 4 in. thick, with 36 pinpoints across. The broad surface, about 10 in. thick, is flat to within about 0.005 in.

• **Wingpile bends**. These are used in various cases in many other applications. The most, intended for 50-lb. bends, are interchangeable, can be used together to make U and V-bends or contact with other wingpile sections. Used with a similar section, the junction of external surface is so smooth that the finger can barely sense the parting line. The only machining required on these castings is in the finger legs and the drilling of pin holes for alignment.

• **Item for portable test set** used in calculations at Naval gas-turbine engine and rocket engine. This unit, used in investigation, is a tapered configuration to direct intensive energy into space. Earlier fabricated unit consisted of about 10 pieces of machined aluminum.

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PRODUCTION BRIEFING

► **Max Vata Engineering Co.**, Inc. entered the pneumatic valve field and is offering a complete line of automatic operated shutoff and regulator valves for aircraft, gaseous streams and industrial uses. Ease of maintenance is noted as a special feature of the new products. Pressure range covers 0.5/100 psi; less than 1 amp of electrical current is drawn at 24 v. d.c. continuous duty. Firm's address: 5420 W. 104th St., Los Angeles 45, Calif.

► **All American Engineering Co.**, Winton, Md., awarded a \$150,000 contract for design, development and production of lightweight engine nacelles from Goodyear Aircraft Corp., Akron, Ohio.



EXACT ANGLES for highly accurate B-52 jets are turned out quickly and inexpensively by **Towson Aircraft Corp.**, at this home made mold and chuck fixture. Angle scales and gauges are fixed in the device by **Colony**. Each plate is tilted to the desired angle by means of threaded rod under the bed plate, a protractor indicating the degree of angle formed by back and bed plate. These angles are true to one degree when ready for machining. The fixture serves an estimated five customers per job.

► **Babb Co., Inc.**, owned by Atlas Corp., is building a plant costing \$550,000 to handle jet engine overhaul on 41 leased acres at Phoenix, Ariz., Sky Harbor Airport. Peak employment is expected to reach 1,500.

► **International Harvester Co.**, New York, has been awarded a \$745,247 contract by Fort of New York Authority for 15 aircraft scheduling trucks to be used at N. Y. International (Idlewood) Airport. Each four-compartment vehicle will carry 8,500 gal. Volume of gasoline handled by **Alfred Aviation Fueling of New York, Inc.**, fuel opera-

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So, at the field most up 32% this year.

► **Airbus National Terminal Co.** has asked the University of Michigan to approve installation of three more on-approach surface gradient storage tanks increasing tank from 218,000 gal. to 300,000 gal. Increased demands by night airlines serving Detroit in great in recent.

► **Acme Corp., Garden City, L. I., N. Y.** has been fully merged into its parent firm, American Steel Corp., and is now a division, as is American North, Springfield, Mass.

► **Ohio State University's Radiographic Laboratory** has been granted authority by Department of Procurement & Production, USAF, to perform X-ray radiography of materials to be used in AF and NASA contracts.

► **Tiger-Avex Aerial Survey Co.** is a new aerial photography firm formed by Flying Tiger Line and Avex Corp., which has leased a specially equipped DH Mustang through Rayl Engineering Co., Denver, to the Army Map Service, Washington, D. C. New service firm has base office at 1108 Valhalla Drive, Berkeley, Calif., and often mapping planes for lease.

► **Loel Manufacturing Co., Eps, Pa.**, has selected its New York regional engineering office to 418 E. 4th Ave., N. Y. 50. Phone: Circle 7-5326 and 7-5327.

► **Pittsburgh Plate Glass Co.** plans to build a \$44 million glass plate production plant at Cumberland, Md. The firm has received a certificate of authority from the Office of Defense Mobilization covering 85% of the cost.

► **Tirelloy Co., Piquette, Pa.** has completed a \$44 million glass plate production plant at Cumberland, Md. The firm has received a certificate of authority from the Office of Defense Mobilization covering 85% of the cost.

► **Kaiser Aluminum & Chemical Corp.** will build a multi-million aluminum sheet and foil rolling mill on a 1,500 acre site near Norwalk, W. Va. First stage of the plant is expected to be completed by mid-1974.

► **Northrup Aircraft, Inc., Hawthorne, Calif.**, has granted an exclusive manufacturing and marketing license for its clustering drill to Consolidated Tool & Products Co., Los Angeles.

► **Tu-16** aircraft problems associated with use of jet engine starts, Lockheed Aircraft Corp., Burbank, Calif., is preparing two charts on Super Constellation.

How to use pneumatics in aircraft TO FORCE FEED FUEL IN PROPORTION TO SPEED



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wing assemblies. Cast 1 is normal size chromate primer to exterior detail parts. Cast 2 is a specially applied catalytic-type chromate epoxy resin, suitable in humid areas, the company says. Applied to the first 35 Eastern Air Lines Super Coaches, the system is slated for all future transports.

► R. M. Hollingshead Corp. aircraft maintenance chemicals unit, is building a new \$1-million plant at Sunnyvale, Calif., which is expected to be in operation early next year.

► Townsend Co., New Brighton, Pa., has purchased Wain Coast Tool & Supply Co., maker of aircraft weapon fire life support chains.

► Fairchild Engine Division, Fairchild Engine and Airplane Corp., has broken ground on its proposed \$40,000-sq. ft. repair plant and turbine test laboratory at Dixie Park, N. Y. The Austin, Co. has been chosen to design and build the new facility, which will replace the division's Farmingdale plant, sold recently to Republic Aviation Corp.

► Casper Alloy Corp. is the new name for Casper Alloy Foundry Co., Hillsdale, N. J.

► Delavan Manufacturing Co., Waco,

Texas, will expand plant space by 6,000 sq. ft., giving it 54,800 sq. ft. Among its products are jet engine nozzles.

► Vest Aircraft Co.'s Parts Division, Sky Ranch Airport, Denver, Colo., has purchased all manufacturing rights, tooling, engineering, jigs, fixtures and existing space for all models of the two-place Escapade personal plane from Bonavia Aviation, Inc., Riverside, Md. Vest recently purchased the entire Swift personal plane project from Truax Aircraft Corp., Dallas, Tex.

► Nut Corp. of America has been licensed for long-term quantity production of brass, steel and stainless steel machine screw nuts using powder metallurgy processes. The firm will start serial output in a Compton, Calif., plant, expects production by late this year to reach 50,000 units per hour. President is Lee B. Daddridge, also head of Daddridge Screw Corp., Gardena, Calif.

► Moog Valve Co., East Aurora, N. Y., plans to extend its facilities by either expanding its current plant, or leasing additional area. Firm, which makes an electro-hydraulic valve, used in missiles and planes, has a \$1.5-million backlog. Sales are slated to be currently at the rate of 52 million annually.



Pilot Goes "For Free"

Pilot would be causal, "for free" if it should wear and instead of steel in the compressor cover. Part of Pratt & Whitney's latest shaft-driven compressor's (P7) in the National Aircraft Show, Dayton, compressor was not scheduled, but number of stage (steel) bolts the condition that it is two-stage gas turbine of right compressor is P7. No external details of engine have been revealed by

PW, but, according to industry information, there is a need at 10 compressor stage—one low, seven high—for a compressor pressure ratio of 12.5:1 (Aviation Week May 5, p. 44). Engine is all-steel, is expected to weigh 3,175-6,250 lb. Estimates are that about 650 lb. per engine must be used if titanium alloys were substituted for steel in various applications in the prototype.



Checking Needle Bearings in Shadow Graph.

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ROBINSON WIRE TWISTER now in 2 sizes!



New 9" Standard for bench work on magnets, capacitors, transformers and sub-assemblies. 22 oz. weight.
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Write for details including prices, terms and list of users. **BAILEY C. ROBINSON CO.**, Box 414, North Sacramento 13, Calif.



Pressurized moist action of turboprop test is set in chamber for check.

Viscount Parts Get Altitude Tests

(McGraw-Hill World News)

London—The problems of flight at 38,000 ft. are being tackled by engineers at Vickers-Knightbridge. Work being done in the largest atmospheric test chamber in England and possibly in the world. Big job each setup can do is emphasized by correct crash findings which show danger of high-altitude stresses.

In this facility have been tested the complete nose section and flight deck

of the Vickers Viscount turboprop transport, and a long list of components for military and industrial use.

Dimensions of the nose chamber are 35-ft. long by 25-ft. diameter; the whole unit (including foundation and the steel test shell measures 85 by 45 by 54 ft. Design and construction were by Vickers; the unit was built in sections at the shop in St. Remy and shipped to Vickers for assembly.

►Viscount Test—Viscount has and the



PCET TAILPLANE of Viscount turboprop stresses could test in Vickers chamber.

What's so difficult about making wing flaps?

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AAIB



Twin Coach Aircraft Division is the only subcontractor for Grumman S2F and Boeing B-52 flaps (above). We also make helicopter landing gear, main wing panels, complete engine sections, wing spars, etc.

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burst pressure at high temp	7330 to 7790 psi
thermal shock	no failure

FLUOROFLEX®-T R-3800 hose assemblies offer permanent plumbing designed for any existing oil...and those to come

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These Fluoroflex-T top quality hose assemblies under a new concept in aircraft plumbing—permanent lines, no matter what the fluid conveyed. They also withstand vibration, take up misalignments, offer better fatigue strength and are easier to install than rigid or all-metal construction.

Stainless steel wire braid reinforces the Fluoroflex-T (Teflon compound) tube. Specially designed fittings assure blowout-proof connections. Pull facts on specifications and tests in Bulletin FRA—send for your copy.

† DuPont trademark for its tetrafluoroethylene resin

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RESISTOFLEX CORPORATION
Belleville 5, New Jersey

test chamber to prove the efficiency of the door seal and built of the Vacuum pressureless hose section and light duct under strong and high static conditions. Through test and pressure leaks leading to the test chamber from the control room, technicians were able to enter and leave the cabin during the test without interrupting the run.

In addition, the chamber has been used to:

- Check functioning and reliability of electro-hydraulic pressure-control units at temperatures down to -85 deg. F, with and without simulated altitude (up to 15,000 ft).
- Check rate of increase and "lock-fallout" response of a gas fire-control director for the Navy at temperatures down to -4 deg. F.
- Develop starting techniques for a 4-cylinder air-cooled aircraft engine which would assure successful starts at all temperatures down to -40 deg. F.
- Check control and focus on the left horizontal tail of the V-2 rocket necessary to overcome friction at various temperatures down to -76 deg. F.
- Since low pressure was not a prerequisite, these experiments were carried out in the open within the main test building but outside the pressure chamber—while other low pressure tests were carried in the main test section.
- Determine handling properties of aircraft fueling lines at temperatures down to -40 deg. F.
- Test turbo-firing nozzles, aircraft and missile components and a wide variety of electronic and hydraulic equipment under extreme conditions of temperature and pressure.

These examples emphasize the versatility of this unit, designed primarily as a stratigraphic test chamber but adaptable as a climatological test unit. Though its main purpose is to help Vickers solve problems of high-altitude flight, thus winning the air of losing expensive experimental aircraft, it has helped pay much of its keep by doing a great range of outside work on a contract basis.

• Performance—The initial rate of climb at the chamber is 1,500 fpm. at an air level pressure and a temperature of 59 deg. F; this falls off to 1,300 fpm. at 68,000 ft. and -74 deg. F. The chamber's service ceiling is 50,000 ft. (3,953 lb./sq. in.), and its maximum design temperature is -57 deg. F. By operating an emergency valve in the 1 1/2-in. vacuum shroud, the chamber can "bleed" from 10,000 ft. to sea level in two minutes 40 sec.

Shots of 60 lbs. are capable of drying 99,000 cu ft. of an duty—dust complete test chamber changes—and thus help simulate the full range of air mass content actually encountered at all the combinations of temperature and altitude the chamber is capable of producing.

The normal maximum suspended pressure at the chamber is 90 lb. though with special transfer this can be raised to 65 lb. However, within them is a special room for strong winds (it is not supposed to be a wind tunnel) most tests are carried out at only six levels.

Controlling the pressure in the chamber are two 140-hp. two-stage "Tylor" vacuum pumps, drawing air through a 12-in. pipe leading into the fixed end of the main test chamber.

The cooling plant, which can take the test chamber from +59 deg. F. to -57 deg. F. in 10 hr., consists of four 150-hp. two-stage ammonia compressors. These cool methyl alcohol, which is

then is circulated at a rate of 33,000 gal. an hour through 16 tons of copper heat-exchanging wires with a total area of 10,000 sq. ft. The maximum rate of heat extraction ranges from over 2.5-million Btu (British thermal units) at -15 deg. F. to about 400,000 Btu per hour at -75 deg. F.

Air circulation is provided by four free-blade propellers, one in each air duct, each with a maximum rated output of 150 hp.

All of the above units are electrically driven.

• Test Setup—Small test items are brought into the chamber through a series of doors on the floor level of the



Research & Development

To design the outstanding HYK-4 and HUG-1 helicopters, Kaman Aircraft has assembled a complete engineering staff . . . men skilled in the fields of mechanical design, electronics and aerodynamics . . . men devoted to the research, development and production of gyro-actuated, semi-automatic, electronic and mechanical devices and systems.

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Their work requires large plant facilities, an impressive inventory of machine tools and technical equipment.

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all are a part of

KAMAN



THE KAMAN AIRCRAFT CORP.
Bloomfield, Conn.



chamber—first through the ventilation heater and next, the pressure wall. For large test items, the entire opposite end of the chamber can be raised and, giving full and free access to the 25-ft. diameter opening. The entire section is first pulled back and then rolled, with hand-operated wheels, along tracks projecting to the side.

The control room is remarkably clean and free of clutter. Access to the test chamber is possible through heat lock and pressure locks. There are observation windows to the inside door of the pressure lock to first visual reference is possible without actually entering the test chamber. Observation ports also

line the walls of the main pressure hull. In the control room are all the necessary controls for making any possible change of condition within the test chamber. It also contains 160 pairs of electrical terminals whose leads go into the chamber itself, thus allowing any desired combination of instrumentation and remote control to be established.

A number of pressure and temperature gauges are permanently built in and read-outs can be taken at the point of a button. Facilities are available for remote control photography, remote control of the tests, taking special readings of pressure, temperature, humidity, stress and strain.

The test chamber is equipped with a number of oxygen and air measurement stations. A special lighted panel in the control room shows which ones are in use, thus providing a general indication of the movements of instruments within the chamber.

ODM Approves More Fast Writeoffs

Although the program to streamline operations of material facilities through tax benefits to meet manufacturing goals is tapering off, the Office of Defense Mobilization approved numerous written and selected proposals in recent weeks.

Certificates of necessity and the percentage allowed for accelerated depreciation for the Sept. 25-Oct. 6 and the Oct. 7-20 periods included:

Boeing Aerospace Co., Seattle, military aircraft, 1945-50, modified with 10% allowed.
Boeing Aircraft & Defense Corp., Portland, Ore., 2 T-37 aircraft components, 201175 modified with 10% allowed.
Boeing Co., Minneapolis, aircraft components, 21125 modified with 10% allowed.
Boeing Aircraft Co., St. Louis, aircraft, 21125 modified with 10% allowed.
Boeing Aircraft Co., St. Louis, aircraft, 21125 modified with 10% allowed.
Boeing Aircraft Co., St. Louis, aircraft, 21125 modified with 10% allowed.

Boeing Aircraft Co., St. Louis, aircraft, 21125 modified with 10% allowed.

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Boeing Aircraft Co., St. Louis, aircraft, 21125 modified with 10% allowed.

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How electrically-heated Multiplate "NESA" Glass is used in the windshield of the Republic F-84F Thunderstreak

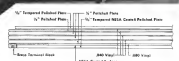
Republic's new F-84F Thunderstreak is the first Air Force swept-wing fighter-bomber. The plane is rated at the over 650 mph climb, and has a combat range for exceeding 1,000 miles.

The windshield of this speedy new jet is made of PPG electrically-heated Multiplate NESA Glass. This special glass will not fog, and it is extra thick to protect the pilot.

The Multiplate NESA windshield consists of 6 pieces of tempered and annealed polished plate glass with wavy film between. See drawing for details. The outboard surface of the inboard glass is NESA coated and carries electrical current at relatively low resistance between bus bars. Heat dissipation is about 345 BTU/ hour/square foot.

Pittsburgh Plate Glass Company makes a wide range of special purpose glasses for aircraft glazing. And a Pittsburgh Technical Representative will welcome the opportunity to work with you on your glazing problems.

For more detailed information, write to Pittsburgh Plate Glass Company, Room 656, 632 First Duquesne Boulevard, Pittsburgh 22, Pa.



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PITTSBURGH PLATE GLASS COMPANY
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L 20 (SEAFAR)

THE DE HAVILLAND AIRCRAFT OF CANADA LIMITED

No Wrinkles Here

Stainless steel and aluminum alloy parts are being produced at Lockheed Aircraft on photo-reduced dies. A relief plate, based on Shell Chemical Corp's Epon resin, formulated by Koch-Rohr, Inc., Lansing, Mich., is used as the main part of the die, while a hard-surface Epon is used for facing the mating surface. No allowance need be made for the thickness of the sheet being formed. Recently reported include reduction in tool cost and production replacement time, and fewer wrinkles.

TOMORROW'S AIRCRAFT: *One step closer*

**Jet pods give aircraft
new speed and range
...greater utility**

Westinghouse J34's—podded and slung under the wings—give the U. S. Navy "Neposac" extra speed and reduce the take-off run. On missions, they can give the extra margin of power to get on target faster and away quicker. Drag is less and performance even better than singlepod.

The record of the J34 shows it well fitted for such auxiliary use. It has been proved in tough operational service; has achieved a 720-hour overhaul life; performed up to 56,000 feet, withstood severe battle damage; and is quick to install and easy to maintain. The J34 history shows progressive design changes and performance improvements to its present highly developed state giving the best specific fuel and weight characteristics available in its class.

Westinghouse turbine engines are ready to give you a wealth of information on the use of J34's to achieve extra speed, range, and endurance for both military and commercial operational requirements—a ready-made opportunity to bring tomorrow's aircraft... One Step Closer. Westinghouse Electric Corporation, Aviation Gas Turbine Division, P. O. Box 285, Kansas City, Missouri. J4907

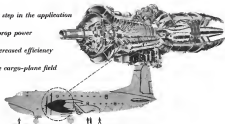


Tomorrow's Aircraft Reaches Cities One Step Closer. The dotted line shows how J34 pods can help aircraft reach optimum altitude faster, maintain more efficient cruise control, and retain extra margin of economy in time and distance for route time can be continually reduced. In, for example, the Los Angeles to New York run which might be cut to under 25% J34 auxiliary can give these advantages to aircraft currently in use or planned for future requirements.

**Jet Propulsion • Aircraft Electrical Systems and Motors
• Airborne Electronics • Wind Tunnels in Plants**

YOU CAN BE **SURE**...IF IT'S
Westinghouse

First step in the application
of turbo-prop power
brings increased efficiency
to the cargo-plane field



—the DOUGLAS YC-124B

Recently the flight of a 200,000-pound sky giant across air legislation, here, the Douglas YC-124B Chieftain.

Powered with four T38 engines—22,000 h.p. in all—the most efficient operating aircraft in its class up. Pro-

cessed quarter for crew and attending engineers in short study engine performance and flight characteristics in southern. Facts gathered to date include an overall efficiency gain in terms of power, range, and lift per pound of fuel, and point the way to larger, faster and

more efficient cargo-carrying aircraft.

The new and advanced application of turbo-prop power is still farther in development. The Douglas leadership in aviation. Plans that can fly faster and farther with a bigger payload are a basic role of Douglas design.



Exhibit to fly in the U. S. Air Force

Depend on **DOUGLAS**

First in Aviation

aluminum parts \$100,000 certified with 81% allowed.

Delta Manufacturing & Research Corp., Jacksonville, Fla., aluminum equipment \$85,000 certified with 75% allowed.

East Aircraft Co., Springfield, W. Va., research and development on aircraft, \$100,000 certified with 45% allowed.

Fluor Daniel Corp., New York, military electronic products, \$100,000 certified with 80% allowed.

Frank Corp., Los Angeles, experimental parts for aircraft, \$10,000 certified with 95% allowed.

Franklin Electric Co., Chicago, airframe aircraft parts \$10,000 certified with 45% allowed.

General Electric Co., Springfield, Mass., aircraft parts \$10,000 certified with 75% allowed.

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APMA Bids for 25% Of All Defense Dollars

Los Angeles—Defense Secretary Charles E. Wilson has been asked by the Aircraft Parts Manufacturers Assn. to guarantee that 25 to 35 cents of every defense dollar goes to small business.

APMA is one of two small-business organizations recently formed in California (Aircraft Week Oct. 18, p. 21).

Secretary General: The plan to set aside mandatorily 20 to 25% of the first spending for small business was put forward by APMA president Mark

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aircraft and standard "specs."

Immediate steel in more than a slogan—it's a fact, here at Ryerson.

Here, the world's largest stocks of carbon, alloy and stainless steel await your call. Experienced steel men who know aviation industry requirements are ready to work with you. And unequalled facilities are at your disposal for sawing, shearing, flame-cutting and otherwise preparing steel to meet any need.

So whether you need a single piece or a truckload, when you need steel quickly—call your nearby Ryerson plant.

Alloy and stainless steel bars, structural plate, sheet, tubing—alloy and stainless steel sheet, plate, pipe, tubing, bars—alloy plate, reinforcing steel, boiler steel, plate pipe, machinery & tool, etc.

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Davis in letter to Wilson, California congressman, Small Business Administration, Air Force and Navy Bureau of Aeronautics.

Davis told Wilson the very existence of thousands of small firms throughout the nation is affected by pullback and withholding of contracts by prime manufacturers.

"It is said more than 400 small business firms in Southern California have had aircraft work withdrawn since January 1954.

This was not due to product quality or cost, Davis said, but resulted from the diversion of large firms to produce the item within their own plants.

He said AFMA "subscribes the enactment of legislation or departmental policy decisions that will ensure a minimum of 50 or 25% of such defense dollar being allocated to small business firms for national defense production."

► **Supplier Shortage**—Davis asserted that continued withdrawal of aircraft work from small firms will force them into subcontracting and create a shortage of supplier plants in event of another national emergency.

The AFMA president also commented that concentration of a major percentage of aircraft production in one one plant is in direct conflict with the government's policy of decentralization.

ing work as a security measure.

He urged the adoption of "concrete policies designed to bring success to the small business firms and permit them to survive in our economic and national defense structures."

AFMA also scheduled a meeting with Navy procurement officials for an explanation of how small business firms can take part locally in the Navy's procurement program.

► **SDMA But-Meowville**, the Small Defense Industries Association sponsored a dinner for more than 200 small businessmen at the Institute of the Antismall Business building to explain the work of SDIA. Those present included representatives from the Navy, Air Force, Small Business Administration, Aircraft Industries Association and major aircraft plants.

Thompson Westworth, chairman of SDIA, emphasized that the association was not looking for handouts or subsidies but only for an opportunity to compete on a fair basis for available business.

"We do not expect subsidies if we cannot save the game money," he said.

SDIA also scheduled a meeting of its local chapters with representatives of major aircraft plants that are located in the area.



Three "pictures" on the tale . . . Simply, Accurately!

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**Requires but a Small Space
—Gives a "BIG PICTURE"
on Operating Conditions**

The leading gear markings shown above are but only of those different instrument applications. Ticks the story "at a glance" on flap position, oil pressure or temperature, fuel supply and other operating conditions. Economical, easy to install in both small and large planes.



Actual Size

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- Impervious to dirt, moisture, gases
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- Filled with inert gas
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- Corrosion resistant finish



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Riverside, New Jersey



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without guns — free guns with guns — close tolerance and integrated engineering services. Aircraft complete inventory — precision scientific equipment.

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UNDER ONE ROOF

By James J. Haggerty, Jr.
(No. 4 in a series)

"Room for four different models of big planes inside Building B-1 at Georgia's GAP-6"

Says James J. Haggerty, Jr., Aviation Staff Writer, *Civilian's*



The new building at GAP-6 (Government Aircraft Plant No. 6), Marietta, Georgia, is to become it was built by the government for the express purpose of efficiently manufacturing the largest of such engine airplanes.

Operated today by Lockheed Aircraft Corporation's Georgia Division with a client list of 16,000 people, GAP-6 is turning out big C-119A aircraft transports and an engine B-47 jet bomber, in addition to the modification of early B-29's. Yet

because of the 75 acres under one roof there is ample space for straight-line assembly of another main-engine airplane. And that will still leave floor space on the same level for the convenient maintenance of the majority of parts feeding to the four assembly lines.

Everything about Government Aircraft Plant No. 6 is new, and, when bigger airplanes are needed, GAP-6 is ready to produce them in quantity. It can even expand very easily if desired.

U.S. Air Force
Govt. Aircraft Plant No. 6

Lockheed
Aircraft Corporation
a Lockheed company

Georgia
Dennison, Marietta

USS Carilloy steel passes rigid tests for propeller blades



THREE MAIN SHAPING areas: propeller hubs are forged and machined from semi-finished Carilloy 4340. They meet extremely tough magnaflex requirements.

FOR BIG PROPULSORS: 1) Ingep sections (a) are welded together to form one blade throat member. Faces are then ground and magnaflexed, Kallend ground, and magnaflexed again (b). 36-8 stainless steels (c) are not magnaflexed in the throat members. Blades are then bent and polished before final magnaflex test and minimum pickling. Expansion magnaflex testing ensures that every finished blade (d) can withstand the tremendous stresses encountered on the latest high speed ships.

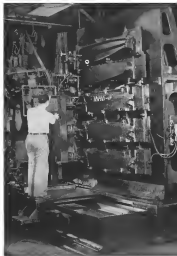
An important manufacturer of propellers for military aircraft has found that in stringent magnaflex tests, USS Carilloy steel performs completely satisfactorily.

The high stresses in propeller blades and hubs naturally require extremely high quality steels. Accordingly, the U. S. Army and U. S. Navy have set up rigid quality specifications requiring that every heavily stressed part must be magnaflexed several times during its production.

With USS Carilloy 4340 electric furnace straight quality steel, this important manufacturer is able to count on the performance required for that severe application. The consistent high quality of USS Carilloy aircraft steel has meant greater savings to the customer through maximum magnaflex rejection of costly fabricated parts.

USS Carilloy steels have established an enviable record for meeting the highest quality requirements. Therefore, when you need a standard AISI analysis or a special steel for an unusual application, it pays to call in a USS Service Metallurgist. He can help you solve any steel problem.

AFTER FORGING AND MACHINING 100% of these sections are bent out on the Hollander Machine. Finished sections weigh about 100 lbs. USS Carilloy steel constitutes a No. 1 quality problem in these heavily-stressed parts.



UNITED STATES STEEL CORPORATION, PITTSBURGH • COLUMBIA-ALCON STEEL DIVISION, SAN FRANCISCO
MEMPHIS ONE & ONE DIVISION, MEMPHIS, ALA. • UNITED STATES STEEL DIVISION, KANSAS CITY DIVISIONS
SANTA FE STEEL DIVISION, ALBUQUERQUE, N.M.

Carilloy Steels

EXACTED PERFORMANCES ON PROPELLERS

CHRYSLER PRODUCTION FACILITY IN CHICAGO, ILL. (1955-56)

UNITED STATES STEEL



G.E.'s decade of guided missile progress is synthesized by one of the missiles designed and developed for the Department of the Army by General Electric being readied for its only mating for flight test at the White Sands Proving Ground.

GENERAL ELECTRIC

How G.E.'s decade of guided missile progress can aid your missile project

Starting on November 15, 1944, General Electric scientists, following on the heels of our advancing armies, began a study of German rocket development. Since that date, G.E. engineers and scientists, working closely with the Army Ordnance Corps, have obtained much guided missile experience.

This experience is available to aid your missile project. Having participated in all phases of guided missile development and production, General Electric is well equipped to handle any missile problem. G.E.'s range of experience includes—Propulsion—Guidance—Systems Test—Air Frame.



PROPULSION The highest specific impulse in the history of rocket flight was obtained by a G.E. designed rocket engine—a pioneer of more powerful rocket engines for the guided missiles of the future.



SYSTEMS TEST Over one hundred surface-to-air test vehicles, designed for guided missile research and development, have been flight tested by General Electric personnel for the Army Ordnance Corps.

For detailed information on how G.E.'s experience in complete guided missile systems as well as sub-system development and production can aid your missile project, contact your nearest G.E. Application Sales Office, Section 124-3, General Electric Company, Schenectady 5, N. Y.



GUIDANCE General Electric's contributions in programmed, radio and inertial guidance have helped industry provide our Armed Services with reliable guidance systems.



AIR FRAME Problems in flying at speeds up to 5,000 mph and around obstacles at 300 miles were encountered in Project Ramjet, where a West German rocket was "tongued" from a V-2 to G.E. flight.

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*Now, Inverted Probe Accurately
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a Rapidly Moving Airplane.*

MODEL 48126-A



Advanced aerobatic design of the Giannini Aerobatic Temperature Probe permits rapid precise in-flight measurements in wing air by measuring samples of ambient air in a streamlined fashion. Giannini Aerobatic Rate of the ambient air is accurate and unaffected by the aircraft's "Wing-Foot" pressure. (15.5 inches in length) weighs less than 100 milligrams. Resistant to shock, vibration, and corrosion. Operates for 100 hours. The probe has two types air flow sensors. A heated probe, or probe with active sensor to capture data for complete real-time information.

G. M. GIANNINI & CO., INC.
AEROBIC INSTRUMENT DIVISION
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Giannini



ROCKER tests tank's ability to withstand deck and vibration load continuously.



FORCE EJECTION system tests tank being ejected. Tank is fired vertically (left) to question tank's ability to handle shock and vibration. Tank is fired vertically (left) to question tank's ability to handle shock and vibration.

Fuel Tanks 'Fly' on the Ground

Special test equipment for jettable fuel tanks has been developed by Panavia Aviation Corp., Los Angeles. The company recently received a \$750,000 contract for the production of 14-ft.-long 500-gal. aluminum jettable tanks for Northrop's F-5H fighter. Another \$250,000 order is for a new system for portable ejection of expendable tanks on Lockheed's F-94C Starfighter.

One of Panavia's new test rigs is a shock and vibration machine. Another development is a pair of test stands to check the company's force ejection system for any work tests and stress. Shock, Vibration Checks—The shock and vibration tests are part of a complete proving sequence for Panavia-developed jettable tanks. The test

vehicle handling tanks up to 2,800 gal capacity, shock and rocks them continuously for 25 hr. to qualify them to military specs. The machine affords these features:

- Vibration speed is established by cyclic rpm, before vibration amplitude is introduced, thus avoiding the possibility of the tank passing through a lower natural frequency that would impose excessive loads.
- Amplitude and speed may be varied while the machine is operating.

- The tank is vibrated while swinging it within a 30-deg vertical angle to check the container for ability to withstand structural fatigue and shaking loads which could result from engine vibration and fast change in flight attitude in addition to changing strength character-

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The square table filled with a beautiful supply of projects involving the aircraft of tomorrow.



The table of good living where a beautiful supply of the extra joys of life grow you day in and day out in the year-round mild climate here in the hills of North Georgia.

*"Y'all", down here, means more than one. We can place Aircraft Engineers of all these types:

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If you're fortunate manufacturing gear to turn out complicated items of gear like this. Used in the Y-4 Penelope Bluebird made by General Mills for the Air Force's B-47 bombers, these gear trains must show a negligible cumulative error and almost imperceptible backlash. The Mechanical Division of General Mills manufactures and assembles these gears on a production basis to such close tolerances that specially-designed optical and electronic equipment is needed for inspection. To meet these extraordinary requirements, even the finest gear-making machinery is revamped in our plant to give performance exceeding manufacturers' claims.

This is another example of the intelligent engineering and precision craftsmanship found in both prime and subcontract production and contract research at the Mechanical Division of General Mills.

HAVE YOU A PROBLEM in this field?

General Mills can help you with electronic and electro-mechanical research, design, development, production engineering and process manufacturing in connection with...

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THIS NEW ROCKET tells the whole interesting story of the Mechanical Division. A copy will be gladly sent to you upon request to your nearest General Mills office. Address: Dept. A-3, Mechanical Division of General Mills, 1020 General Avenue, Minneapolis 13, Minn.



MECHANICAL DIVISION OF General Mills, Inc.

location, the rig establishes the ability of the test to withstand fatigue.

The shock and vibration tests complement other checks—outdoor static tests, environmental chamber tests, and in-flight proving.

Power-Pulse Tests—A pair of vertical and horizontal test stands assess reliability of the company-developed force ejection system, designed to eject the airworthy fuel tank at any speed or flight attitude.

The vertical stand allows the store to be fired on a flat trajectory up to 10 ft up to a restraining net, to check the system's ejection power.

On the horizontal stand, stores are fired directly downward. The test plane often is substituted for tanks and fired down 15 to 18 in. to determine force expended. The tests also determine momentary pressure in the chamber and other values which help check emergency levels and design curves.

When accuracy, defense and have been developed in the outdoor firing stands, the unit is moved to an environmental test chamber, where actual conditions of pressure and temperature are simulated. This is followed by in-flight check.

Navy Contracts

Contracts recently announced by the Navy's Aviation Supply Office, 700 Robbins Ave., Philadelphia 11, are:

Aluminum Mfg. Co., 1010-1011 Rapidville Blvd., Los Angeles 44, contract for material to produce government-owned components, \$10,000.

Bond's Products, Inc., Seattle, Wash. Ship, 141 Seattle Drive, South 26th St. Ind., maintenance parts for operation of various Boeing engines, 10,000 ea., \$111,320.

Bond's Products, Inc., Seattle, Wash. Ship, 141 Seattle Drive, South 26th St. Ind., maintenance parts for Lockheed B-70 jet engine, \$112,000.

Chicago Metal Repair Co., 1100 Blueprints Ave., Chicago Park 2, work for electronic engine failures, \$11,000. Supply the same parts used in electronic engine failures for the engine.

Elmer's Metal Repair Co., 1111 Van Ness Ave., Seattle 4, contract for operation of 141 ea., \$112,000.

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From their very inception, the famous Grumman "Cats" have made history as makers of the blue ... and today's deadly Tiger sports the forward advance in Grumman.

From its design and manufacture the aircraft circuit breaker, specialized, has progressed throughout the years to the new high repeat capacity 100/150-2 ... recognized in aircraft breaker design and performance.

All Klixon Circuit Breakers receive the exclusive 100% ultimate trip rate plus a 100% short time tolerance test and X-ray inspection.

Write for specifications and which gives complete information.

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METALS AND CONTROLS CORPORATION
SPENCER TECHNOLOGICAL DIVISION
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performed under the conditions of a benchtop test. It is reported that the thrust exceeded the rated 7,700 lb during the static test period.

The Vector is slated to replace the Rolls-Royce Tyne as the powerplant in Dassault's Mystere 4A.

Reds to Return Airline

YUENNA

The Soviet Union is preparing to hand over to the Hungarian government all joint Soviet-Hungarian enterprises, informed sources have reported. This would include Moskovit, the Soviet-Hungarian airline.

Similar steps have been taken in recent weeks in Romania and Bulgaria.

Armagnac Spans Atlantic

PARIS

An SE 1610 Armagnac four-engine transport belonging to Societe TAP recently set a record as the first transport of French construction to cross the Atlantic carrying passengers. It flew from Bordeaux to Paris carrying the French Secretary for Air, Marcelle Caron, and other dignitaries who had been invited by the Colombian government to attend the opening of a Franco-Colombian mining project.

Societe TAP has eight Armagnacs. Seven are used normally on the line's Paris-Buenos Aires. Powerplants of the 77-hp design are Pratt & Whitney R4000-15 engines.

The Bordeaux-Paris crossing, made at Dassault's request as publicity for French aircraft, required three stops—Geneva, Paris-Marseille and Dakar. However, there are no plans to use the Armagnac in regular trans-Atlantic service.

Fleurbaey II Renamed Paris

PARIS

Monsieur Fleurbaey's 760, daughter of the famous aircraft, has been following a busy schedule of demonstrations for French aviation and NATO officials.

The plane, formerly known as the Fleurbaey II (Armagnac) was Sept. 4, 1961, has been officially renamed the Paris.

Bad News for Whales

JOHANNESBURG

The South African whaling industry has reported the remarkable conclusion of a very long season.

Using its airplane to spot the quarry and radio its position back to the shore-based fleet, the whalers managed to catch a little more than 1,000 whales in three weeks.

Lamson + Sessions... offers all three in Aircraft Fasteners

1. SOURCE INSPECTION
2. BONDED STOCK
3. STATISTICAL QUALITY CONTROL

BOLTS

- Self-Drilling, AN3 to AN12
- Self-Drilling, AN23 to AN37
- Self-Drilling, Drilled Head, AN73 to AN81, AN73A to AN81A
- Self-Drilling, Close Tolerance, AN173 to AN182
- Self-Drilling Head, AN101001 to AN101900
- Self-Drilling, Drilled Shank, AN101901 to AN102800
- Self-Drilling Head, AN103801 to AN103700
- Self-Drilling Head, 6-Hole, AN103701 to AN104600
- Self-Drilling, Close Tolerance, NAS464
- Self-Drilling 100° Flat Head, Close Tolerance, High Strength, NAS5333P to NAS5340P

NUTS

- Self-Drilling, Abrasive, AN210
- Self-Drilling, Abrasive, AN315
- Self-Drilling, AN216
- Self-Drilling Head (Hex Head) 325
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With a wealth of experience in working with leading aircraft manufacturers across the country, Monadnock is able to design specialized fastening devices to meet your precise requirements and to produce them in volume.



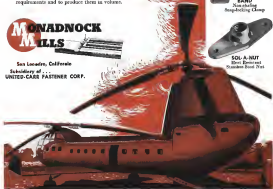
San Leandro, California
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UNITED-CARR FASTENER CORP.



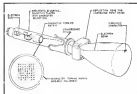
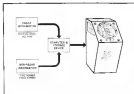
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Bolt and Capnut
Threaded Fastener



SOL-A-NUT
Bolt Remover
Standard Bolt Nut



AVIONICS



WRITING COMES EASY to Chascom. Left panel shows how tube and operator data are combined, tube operation is shown at right.

'Educated' Tube Will Aid Air Defense

By Philip Klein

San Diego—Covair's Chascom, the "educated" cathode ray tube" which can point out up to 25,000 letters and numbers per second on its face, has taken on an important new military job. Used in air defense equipment, it identifies targets on radar scopes by displaying coded information as to air craft type, speed or fuel, speed, altitude, and track number.

Chascoms are being built for Air Force and Navy. In addition, the Chascoms should have similar important applications to civil air traffic control. First invented nearly three years ago at the National Institute of Radio Engineers convention by Joseph T. McNamara, its inventor, Chascoms earned quite a stir (*Aeronautics Week* Mar. 24, 1952, p. 55). Some publishers viewed it as the key to a new rapid printing process. Then it dropped from public sight.

In the intervening period, Covair has been quietly perfecting and setting up to produce the new tube. Variables which the electronics industry first concentrated on setting up to make conventional TV-type cathode ray tubes were multiplied many fold at Covair because of the Chascom's added precision and complexity. The company's lack of experience in this field also made the learning process more painful. However, Covair expects to be turning out four 10 inch-diameter tubes per day in the near future.

►How Chascom Operates—In the Chascom, a small matrix with 64 (or more) different letters, numbers, and symbols set as it (internal helix) is located between a conventional electron gun and fluorescent tube face. By ap-

plying appropriate voltages to a set of vertical and horizontal deflection plates, located between the gun and matrix, the electron beam can be squinted through any of the matrix chascoms. In passing through, the beam's cross section is focused into a corresponding shape. The beam is then converted by a converging coil.

By applying another pair of appropriate voltages to a second deflection system, located between the matrix and screen, the character-shaped beam can be deflected to position the letter, number, or symbol at any desired spot on the screen (see sketch, above, right).

By proper selection and sequencing at the two pairs of deflection voltages, any required message can be written on the Chascom's screen. The tube's rapid scan rate, and the persistence of its fluorescent screen, make it appear to the human eye that all characters are printed simultaneously.

►Radar Display Problem—The Chascoms may solve one of the most pressing problems of air defense and civil

traffic control: radar operators how to keep track of a mass of targets on their scopes. Present PPIs show only target numbers and distance, plus, in military radar, whether the target is friend or foe. (When civil aircraft are equipped with radar transponder beacons, civil controllers will also be able to identify targets.)

But there is often important information, particularly for military radar operators, such as airplane altitude, speed and track number. Military height-finding radar and tracking computers can determine this information, but displaying it on a conventional PPI is the problem.

In the past, the ground controller has had to scribble information from several scopes simultaneously, or else resort to getting boards to which the data is manually transferred and converted.

►Chascom Solution—The Chascoms, and its associated electronic converter, can automatically combine and display information from several radar and height-finding radar, from tracking computers, plus aircraft reports such as the number of aircraft in a flight, as a single PPI. Several hundred aircraft can be displayed in this manner, Chascom reports.

This explains why the AF's air defense (Aerospace Lab) group, the Navy and the Army reportedly are keen on the new tube.

In one typical arrangement, five different sets of information about the target can be displayed in a single character group, three character wide and high.

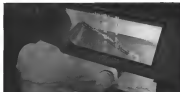
The center of this three-by-three character group will appear on a PPI in a position corresponding to the



NEW CHARACTER display completely identifies target on air defense scope



CHARACTER-FORMING MATRIX, smaller than a dime, is checked for shape.



ELECTRONIC BLN is assembled under glass bowl by insulation mounting base free glass.



CHARACTERON CATHODE RAY TUBE has vacuum of 1×10^{-6} mmHg. This is one reason the tube tube costs no more than a TV tube of the same size.

more optimum than actual capacitance in converting characteron output to permanent printed form.

However, the company was deluged with inquiries from business machine firms and publishers, Gerlach says. A market survey by two research organizations confirmed that there was an excellent market, "if and when" a suitable day-printing process for reproducing characteron output was developed. In-

vestigation indicated that this was a fairly long-term development.

Military Interest Develops—Measurable Characteron learned that Navy Electronics was working on a non-automatic aircraft identification system to provide information such as friend or foe, airplane type, altitude, speed, and track number. Further investigation showed that the Air Force and Army had similar problems. The Characteron

seemed like a natural for displaying such information.

Defining its commercial market requirements, Characteron formed out the development of a day, high-speed printing process to Hiramco, Inc., Cleveland, in order to concentrate on the military market.

Learning the Hard Way—The art of building CRTs, a closely guarded corporate secret in the electronics industry, was something Characteron had to learn the hard way. In fact, Lincoln Labs people actually urged the company to avoid "re-invention" with techniques employed in producing low-cost TV picture tubes, Gerlach says. The reason was the much higher order of reliability which the military services required.

For example, a TV picture tube is guaranteed against failure for one year, which means about 700 operating hours in the average set. However, Lincoln Labs wanted the Characteron to operate for a minimum of 4,000 hours without failure, and for 10,000 hours if possible.

The actual design and manufacturing cost are reflected in the difference in price between a TV picture tube and the Characteron. A 19-inch TV tube will sell for around \$10-15, whereas it will be 1000 times before Characteron gets the price of the 19-inch Characteron below \$1,000.

More Money for Less Air—One factor which affects tube life (and cost) is the degree of bulb evacuation. Gas left in the tube wastes and hampers the cathode, eventually destroying it. Whereas TV picture tubes are evacuated for a mere 45 minutes, the Characteron goes through a 24-hour cycle of heating and evacuation that brings bulb vacuum down to 2×10^{-6} mmHg, Gerlach says in contrast to $1/1000$ th of a millimeter of mercury.

Following Lincoln Labs' advice, Characteron has tried to learn the CRT art rather than "start playing with know-how in the field. For instance, of its 10 tube failures, only two have had previous CRT experience. On the engineering side, all were new comers to the picture tube field. Characteron has called upon outside consultants and Gerlach credits Massachusetts Institute of Technology scientists for their help in electronic optics design and fabrication techniques.

Defining Thomas—Some segments of the electronics industry were skeptical as to whether an airborne aircraft-facturer could bootstrap itself into this ultra-precision business, Gerlach says.

When an air defense system contractor had a requirement for more than 100 military display tubes, Characteron gave only 60 days to produce three prototype Characterons to qualify for the business. This came at a time when the company had not yet set up its manu-

MARION COAXIAL* MECHANISMS MAKE NEW AIRCRAFT INSTRUMENTS LIGHTER, SMALLER, MORE STABLE



A new AN type multi-element stored instrument, incorporating recently developed Marion Coaxial Mechanisms, has greater flexibility and performance stability than any other instrument of same space size and weight. Applications of the new instruments, available with two, three or four elements, include compasses, reflectors, temperature indicators and radio navigation instruments. They meet the requirements of Army-Navy Aeronautical Division Standard ASD-1412 in 19" and 24" diameter instruments.

The Coaxial Mechanism makes these improvements possible regardless of new design attempts in the mechanical design of storing and mechanisms. The Coaxial assembly provides a substantial magnetic field of great strength, uniformity and stability. Performance and stability are enhanced in the better simplicity of the design. Only two instruments hold the world's smallest assembly footprint. All critical dimensions are machined from a common master (the bearing shell), facilitating positive adjustment of parts.

MECHANISMS BY MARION

The Coaxial Mechanism applies the very best Marion technology by Marion is designed to meet the particular requirements of a specific application — and to provide substantially improved performance with fewer parts than in other designs, conventional mechanisms.

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Here are three more reasons why tomorrow's finest aircraft, like today's, will fly with Continental power. Two of them represent further developments of the famous 0470 series—one supercharged, the other supercharged and fan-cooled expressly for helicopter use—while the third is a brand new power plant, engineered and built with the needs of multi-engine utility planes in mind. They have one thing in common: as products of the pioneer in power for utility aircraft, all three rise high in those qualities which go to make up dependability—qualities which have made Continental engines flight unduplicated first choice.



0470
LIQUID COOL



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GENERAL SPECIFICATIONS

	12470	12480	12490
Displacement	330	360	390
S.F.P.	3800	3900	3900
Max. RPM	2100	2100	2100
P.T. Power (1400 RPM)	360	360	390
Length (in.)	22.75	25.00	25.25
Height (in.)	20.75	20.00	21.75
Width (in.)	13.50	13.50	14.50
Weight (lb.)	1,000	1,100	1,175
Stroke (in.)	4.00	4.00	4.25
Oil (in. in.)	4.75	4.75	5.00
Compression Ratio	6.0:1	6.0:1	6.0:1
Rated by SAE with Accessories (1400 RPM)	300	300	375
Type of Prop.eller	Fixed	Fixed	Fixed
Reverse Fuel Control	Yes	Yes	Yes
Supercharger Ratio	12.5:1	12.5:1	12.5:1
Supercharger Drive	Shaft	Shaft	Shaft



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Aircraft Engine Division
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factoring operations and linked many of the necessary machines.

However, interestingly for Corsair, a small Eastern TV tube manufacturer had recently gone out of business and all of his machinery was up for auction. When the opening gavel sounded, Corsair representatives were in three biddings. Before it was over, they had the machinery they needed.

► **Build Strength Approach**—Working days, nights, and weekends, Corsair people were able to meet their 60-day deadline. The big production order then followed. Corsair admits that the build-strength approach has been necessary but costly, with a high number of tube rejects at the start. Out of one batch of 50 "bottles" received from the glass tube manufacturer, Corsair rejected 22 ones before it started to make them into Chameleons, Carlsbad says.

Production of the Chameleon's complex electron optical system, with its double set of deflection plates, electro-magnetic lens system for converging the beam, and deflection yoke assembly, coupled with a stringent display linearity requirement, has posed more difficult problems.

In some cases, Corsair reports it has had to pioneer new techniques, then design the machine to employ them. For example, the initial assembly welding (used to increase display brightness) is "induced on" the sloping throat of the tube, using a General-developed technique.

By keeping the size of the Chameleon matrix small, tube design problems are simplified, but this introduces manufacturing problems. In a typical matrix, the Chameleon has only 1,012 in light-volt must be clean, sharp. The require-



Around She Goes

Might think winter is a cycle of winding 30-40 gauge wire of wire up to 4000 feet into coils whose fused inside diameter is 3/8 in. or less. It explains slow load winding of small rings with fine wire. Maker is Evershore Electric Co., Paul & Rudolph St., Boston 19, Massachusetts, Mass.



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ment found Casare to develop an improved photo-etch process for making the matrix.

► **A Separate Operation**—The Chatterbox project has been set up in a steps rate entry, with its own 13,000-sq. ft. building located several miles from the main Casare plants. The project maintains its own set of technical books, establishes its own circular rates.

The present staff numbers around 70, of whom approximately 65 are electronic and mechanical engineers, physicists, chemists, and technicians.

Many of the electronic people developed the associated equipment which is required to convert input analog or digital signals into correct deflection voltages for the Chatterbox. One novel experimental converter accepts Morse code and automatically translates it into corresponding letters and words on a Chatterbox.

► **Over the Hump**—Although Casare may not yet be out of the production woods on its Chatterbox project, Gels believes the clearing is in sight. If that argument is correct, the area just partially can be ground of having made a place for itself in one of the toughest phases of electronics.

***** FILTER CENTER *****

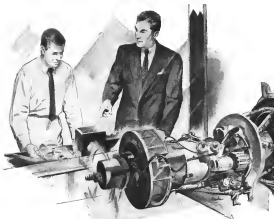
► **PFI Filter**—Better resolution of closely grouped targets on airborne radar scopes should be possible with new General Electric Fin. cathode ray tube whose beam width is only half as great as its predecessor—0.25 mm. vs. 0.50 mm. The new GL-SPF14 A has magnetic focus and deflection, medium-long persistence phosphor, and is interchangeable with the earlier GL-SPF14.

► **New RTCA Reports**—Radio Technology Commission for Aeronautics has issued new reports on minimum performance standards for airborne electronic equipment.

► **Radarscope**—hence receiver, paper 37-54/DP-37, 30 cents
► **ILS glide slope receiver**, paper 38-54/DP-38, 30 cents
► **ILS localizer receiver**, paper 39-54/DP-39, 30 cents
► **VDR**—bearing, accuracy and error, paper 66-54/DP-36, 50 cents

RTCA's address is 3340 T-5, Room 2014, 12th St. & Constitution Ave. N.W., Washington 25, D.C.

► **Rest a Flying Machine**—Lab-to-mech manufacturers looking for a flying laboratory in which to test their products can visit Martin 2-0 to 2-0 in application to purchase from Wright C. World Associates, 516 Fifth Ave., New York 36, N.Y. The 2-0 is one from the East of Pioneer Air Lines. —PK



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the nut's pitch diameter is held within .005 in. for sizes through 1/2 in. and to within .006 in. on the ball-nut diameter nut. The SPS engine nut series is being made in sizes from .750 to .750-in. diameter and has National Fine threads. Nut is of AMS 524C alloy steel, customers placed against corrosion. They are shop annealed as well as locktite, so that they lock in place whether wetted or not, the maker states.

Standard Power Steel Co., Jacksonville, Fla.

ALSO ON THE MARKET

Rugged thermocouple which measures very rapid temperature changes of metal surfaces such as aircraft skin, gun bores, piston walls, etc., gives rapid response to plating only 0.0004-in. thick at junction. Maker reports that reaction temperature reaches 63.1% of single scale at a step change in about 1/2 microsecond. Device has been operated satisfactorily at very high pressures and under severe mechanical vibration.—Midwest Research Institute, 4049 Pennsylvania, Kansas City, Mo.

Exposable resin for silicone foam structures comes as ready-mix powder that requires curing, but heat to activate it. Only negligible pressure is exerted during exposure, so lightweight molds may be used. No preheating is required. Density may be controlled. Viscos are labeled R-7821, R-7802, R-7803, set up to 35 seconds.—Dow Corning Corp., Midland, Mich.

Organic welding material known as Typoweld joins metal to glass, metal to porcelain, metal to metal. Typoweld comes as rod form and can be applied with automatic heads and little or no pressure, but forces very powerful union. Powder and paste adaptions are available.—U. S. Sintercoat Co., Research and Development Lab., Akron, Ohio.

Vacuum Mobile Pump Wagon provides a flexible source of vacuum that may be moved around the shop as whenever it is required. The unit weighs 900 lb., is 15 ft. high, and requires only 4-1/2 S ft. of floor space. It has a 3 hp motor and dual V-belt drive. It operates from ordinary electrical connections.—Vacuum Forming Corp., Port Washington, N.Y.

Air scrubbing chamber is now spray paint booth is said to be practically 100% effective in removing paint particles from the exhaust air. High efficiency is due to specially designed spray loader mounted in two curved baffle plates.—DuPont Co., 679 4th St. S.E., Minneapolis 14.



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Praise

Many thanks for the story George Chase has done on the Reader Piping Show Case in Aviation Week.

You did make one right time, however. You stated, "Rear-mounted, 100-hp. engine for liquid crystals, such as Bendix is providing for the Republic F-105F, Boeing F-4D, etc." Actually the first stage engine is a new design for thrust of 1,800 ps. and presently is used in conjunction with the Koffman-Peterson Fuel Air Compressor System. The Liquid Oxygen Compressor which recently began its liquid flow to a position from its handling was a separate display then applied to the engine. All other items were reported with you and precise degree of accuracy.

CLARE SMITH, Advertising Manager
Edgemoor Pacific
Division of Bendix Aviation Corp.
Teterboro, N. J.

The article, "Vacuum Melting Improves Jet Alloys," by Irving Shain, which appeared in the Sept. 6 Aviation Week was well done and certainly should be of great interest to your reader. We would like to publish this article and would appreciate being informed of costs of reprint in 1,000 and 1,500 quantities.

JOE STROTT
Art Advertising Manager
P. F. Shoen Machine Co.
Philadelphia 26, Pa.

I would like to congratulate you as the high standard of your publication. It is, in my opinion, unexcelled.

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AIR TRANSPORT

ICAO Sets Up New Air Navigation Plan

- Montreal conference revises North Atlantic system to meet technological advances and transpolar routes.
- Changes also provide for introduction of turboprop and turbojet transports, increases in airline traffic.

International Civil Aviation Organization's new navigation plan for the North Atlantic has been completely revised to meet advances in aviation technology, augmentation of transpolar flights and the potential introduction of turbojet and turboprop transports.

Delegates to ICAO's North Atlantic regional air navigation symposium in Montreal also had before them several goals, and they forecast total trans-Atlantic crossings this year to reach 68,000. A 50% increase over this figure is anticipated within the next five years.

Present language navigation aids while allowing aircraft to navigate safely, do not permit extremely accurate position fixes at all times. The symposium's wide spectrum technical aircraft in flight, severely limiting in-flight key aircraft made to takeoff.

Long-range Climb—To improve the language navigation system the meeting recommended that coast radio becom be installed at Iceland, southern Greenland, The Azores, eastern New Zealand, Labrador and at Vancouver Island and Atlantic City in the U.S.

With the existing coastal stations in Europe, this will provide a complete language navigation chain for the North Atlantic and make it possible for aircraft in flight to report their position back to traffic control with accuracy and regularity.

Until these new facilities are provided, the meeting recommended that in general a minimum separation of 30 miles along track should be maintained by two aircraft on the same or converging tracks. There also should be a lateral separation between aircraft on parallel tracks of 120 statute miles at sea level.

Improved Forecasts—Recommendations also were made for improvement in the surface and upper atmospheric meteorological observation networks and for increasing as much as possible the observations program of the North Atlantic Ocean station vessels.

To provide for future high altitude operations, upper air observations up to 55,000 ft. were recommended.

A general setup in the exchange of

meteorological data is required to meet increased demands, delegates said. They noted the World Meteorological Organization is conducting an aerial survey, the possibility of transmitting radio-based and radio/radar wind data obtained at stations in North America, Western Europe and at the North Atlantic within 30 miles of the track. The balloons needed for maximum reporting height—overriding the schedules of the weather balloons so that maximum benefit may be derived from the advanced flying time of these reports.

WMO also was requested to include reports of surface and upper air other means in synoptic exchanges between North America and Europe in time to allow them to be delivered to the meteorological offices, providing service for North Atlantic and polar flights within one hour of the time they were filed or heard at ocean station vessels.

Communication Networks—In a separate session, an international break telecommunication network, plan for the region was reviewed in detail. Required improvements were considered, and a number of events were held to be defined. Recommendations were made for their immediate study.

The possibility of setting up a multi-frequency communication route between Europe and North America to a specific frequency of 3000 MHz was proposed. Two were investigated, and it was agreed

that tests would be undertaken to see if that might be feasible.

The communications committee also prepared a complete plan for radio-navigation aid for the region, including existing aids and those new aids considered necessary for operational requirements.

Weather-Based—Field-forecasting as a means of possible establishment of weather-related aids, the meeting found that there is no requirement for radio navigation aids for the present time, as long as the present time for traffic is achieved, progress.

It also mentioned the requirements for aircraft safety and noted that the establishments planned for regular use in the region would, in many cases, meet the requirements for alternate.

Recommendations also were made for the establishment of certain radio aids, a direct approach and land in lighting and navigation and had weather lighting aids.

Traffic Problems—The high-density traffic problem at Gander Airport came to the fore. Delegates at the meeting. It was noted that difficulties were being encountered by increasing aircraft in obtaining desired flight levels in the vicinity because of the high traffic density in the Canadian coastal area.

Delegates considered the desirability of easing the demands of flights around Gander and noted Canada to consider installation of a number of small ensembles. Installation of such stages in the Canadian territory was noted between New York and Gander. New York-Gander, New York-Montreal-Gander also was suggested.

Transportation Data—Noting the status of the North Atlantic region, delegates advised Airlines Systems, it was pointed out that a considerable number of gaps exist in the chart coverage of the North Atlantic area.

In addition, there are certain deficiencies in available charts, particularly concerning the elevations of the Gander lead-in cap.

In order to improve chart accuracy, it was recommended that all airlines produce such charts arranged to enclose basic data.

Additional discussion was devoted to alternative setting procedures for the new North Atlantic region, involving changes in procedures for the use of Iceland, Bermuda and the Azores. Introduction of suitable transition procedures was suggested for the entire boundaries of the region.

New Merger Deadline

Finance and Commerce Air Lines have extended the deadline for their merger contract from Dec. 30, 1954, to June 30, 1955.

The original contract was signed Dec. 18, 1953, to merge the proposed consolidation. Subsequently, the two airlines applied to Civil Aeronautics Board for approval. The Board has held hearings and will present, and a final decision is pending.

The shareholders of both companies approved the consolidation last February.

Rentzel Takes Over Slick Management

Management control of Slick Airways has been turned over to Dallas W. Rentzel, former Civil Aeronautics Board chairman, and Ray Woods, his associate in two Southwest Trucking firms, at a meeting of the all-share Slick's directors last week.

Rentzel was named chairman of the board and "chief executive officer" (AVIATION WEEK Sept. 27, p. 14). As chairman, he succeeds Ed F. Slick, founder of the company. The post of president is vacant. It formerly was held by Thomas L. Greer, who left Slick two months ago.

Executive Committee—Rentzel and Woods, partners in Auto Transport, Inc., and Texas Auto Transport, Inc., were made directors. Rentzel will continue his association with these two firms.

A newly created executive committee to act for the board of directors consists of Rentzel, Woods and two representatives of the old management—Slick and Loren J. Macnaman. A fifth committee position is vacant.

Rentzel and Woods have an option for purchase of 100,000 shares, at 22½¢ of Slick's stock.

► **Rentzel's Cash**—In taking over control of the airline, Rentzel made three points:
 ► Cargo carriers should cooperate in

the common goal of getting a larger slice of the freight traffic now moving by surface carriers. Rentzel declared "We enter this phase of further development of the airlift potential of the U.S. with every intent to cooperate with other air carriers."

He told AVIATION WEEK that specifically, he hoped there would be no new rate wars. He said the new management had not decided whether to pursue Slick's \$10-million anti-trust conspiracy suit against American, United and Trans World Airlines.

► **Passenger new techniques** in freight handling will be introduced.
 ► **Additional DC-8s** and C-66 cargo planes probably will be purchased by Slick. The fleet now consists of two DC-6Bs and 10 C-66s (it had been less well known as a transporter of a freight with Flying Tiger Line, and the addition of FTL's fleet of 16 aircraft).

► **All-truck carriers** should be authorized to transport mail on new routes—"in bulk," Rentzel was quoted as saying. "It is better, in fact, than other air mail routes" to the all-freight lines.

Bunker Ties Subsidy To Copter Success

Los Angeles-Success of future commercial helicopter service for passengers and freight is dependent upon subsidization, Cal William B. Bunker,

commandant of the Army's Transportation School at Ft. Belvoir, Va., told the western section of the American Helicopter Society last week.

Some 100 helicopter manufacturers, operators, engineers, designers, pilots and academy graduates gathered for the first full two-day function of the western section of the AHS.

Bunker told Bunker that he believed that a new transportation mechanism that did not require subsidization of its operations would have an almost no possible take.

Transportation provides a demand for its services over a period of years by offering a frequent, safe and dependable operation, but this service can only be built up gradually as experience is gained and the public demand is created, he said.

"The helicopter has many unique tool and equipment problems which must be developed during the first years of its operation. During this period it must be heavily subsidized by some source in order to survive."

He said reliance on present express awards and current philosophies of trial and error would not appear likely to result in a rapid growth of helicopter transportation.

► **Industry Support**—Bunker, he said, should come not only from the government but also from those who would profit more from helicopter service—including cities, municipalities, local service industries and trucklines with short-haul capacity.

Bunker urged the Aircraft Industries Association and Air Transport Association to form a joint committee to develop a concrete plan to ensure the continued subsidization of the helicopter in both its civilian and short-haul transportation vehicle.

► **Copter Experiment**—David E. Portie, director of research for Mobilair, Airline told of experience in the first scheduled service in the introduction of the latest helicopter—passenger line in the United States.

"Even though it would take eight passengers in each trip to break even with expense, it seemed to us that it was the highest rate we could charge and expect to achieve at 50% load factor," Portie said. Thirty days of operation on such a level has proved that true.

"Passenger" comprised of high prices, he said.

► **Tricked Volume**—Mobilair said it is

deserted its one-way helicopter passenger fare to \$12.95 without federal tax, or 14 cents per mile.

What are you work on passenger will now usually triple," Portie said. "The company factor in its transportation will govern transportation by helicopter. Passenger convenience, time saved and a passenger fare, however, will be used to test service and induce acceptable income as travel."

Sabena Fights Slump With New Schedules

Sabena Belgian Airlines will combine its expanded winter schedule with an extensive sales campaign this winter in an effort to offset the usual off-season slump.

For the first time, the airline will offer through flights from New York to Paris, Frankfurt, Moscow, Milan, Athens and Tel Aviv. It will operate an Athens-Moscow flight per week, from New York with a stop over day but Wednesday end the spring.

► **Combination DC-8-Sabena** also will emphasize combination-class service. Five of the ten DC-8 flights from New York will carry both classes, 48 aircraft forward and 12 first class in the aft cabin.

The Thursday flight from New York will be offered DC-8 service to Manchester, Brussels and Milan.

In Sabena's European network, first class service will be reintroduced in several sections. All flights will be aircraft last year. This service will be provided in combination-class aircraft.

► **Copter Cuts**—The airline plans some reduction in flight frequency on its helicopter network during the winter. The last departure in the morning will be from Geneva to Zurich and the last service of the day according to order in all airports will be tapered by reduction.

On the Brussels-Los Angeles route, the number of flights will be reduced from two to one on Tuesdays, Thursdays and Fridays—leaving two flights on remaining days.

On the Brussels-Rotterdam route, three-day service will be maintained only on Mondays, Wednesdays and Saturdays, on Brussels-Colombes routes, there will be one flight daily.

► **Accessed Caribbea**—Within Europe, Sabena will reduce frequency on some routes carrying largely tourist traffic, such as those in Rome and Sicily. Naples service too will be suspended next spring.

The carrier will offer overbookings in connection between Copenhagen, Copenhagen and Stockholm. Thus, for example, will have a one-day direct link with Barcelona, reducing the overall time for the run to 2.5 hr.

Lufthansa 340s

BOEN—The Allied High Commission has just said a letter to German Federal Chancellor Adenauer granting permission to request less German 140s to delivery to Lufthansa.

According to reliable sources, the letter grants permission to request only and restricts Lufthansa to buying rights over Germany. Permission to use commercial operations will be granted in "the future," the letter is pointed out.

(In New York, a Lufthansa spokesman told AVIATION WEEK the airline will take delivery on its last 140 this week.)

Belgian Cargo service will be reduced from 11 to 10 weekly flights, all once between class service.

North Central to Get Chicago-Detroit Route

Local flights between Chicago and Detroit would be shifted from American to North Central Airlines. New a memorandum filed in Civil Aeronautics Board examiner Curtis C. Henderson, who stated the route would be more economical and provide better service.

North Central, Lake Central and Cook Air Lines, the local service carriers in the area, all had applied for the route.

American now flies one weekly flight between Chicago and Detroit, offering local service in South Bend, Indianapolis, Battle Creek, Jackson and Ann Arbor. In addition, nonstop service is offered between the two cities by Air Canada and United Air Lines.

► **DC-7 vs. 740**—The examiner's report says American operates what currently is a local service operation over the route. A 740 with a Carrier 740 with an average load factor of about 60%.

The route traffic would provide a load factor of about 70% on the DC-7s and be local service.

In addition, DC-7s are lost Coast Carrier schedules because of possible ground space required by the 740 and the short distances between stops.

Use of DC-7s would permit direct service to Milwaukee, now served through Battle Creek because the Kalamazoo Airport is not licensed for use.

► **Expanded Service**—The Detroit-Chicago segment fits well into both Lake Central and North Central's routes, but NOK, get the red because it appears best able to serve the route.

Quail's route into Detroit is on the opposite direction from Chicago, as the segment would amount to a stop over.

North Central plans three roundtrips

daily over the non-stop route. The belief is that better scheduling and faster and more frequent service will generate enough additional traffic to warrant the expanded service.

BOAC, KLM to Benefit From U.S.-India Split

British Commonwealth Airways Corp. and KLM Royal Dutch Airlines are expected to benefit immediately when Trans World Airlines and Pan American World Airways pull out of India Jan. 16, effective date for expiration of the Schengen agreement between that country and the U.S.

India has insisted on limiting the number of Indian passengers traveling through airports as well as the frequency of scheduled services. British, French, Holland and Italy have given in, but the U.S. has refused to agree on the present or agreement.

For the time being, removal of U.S. competitors will not help Australia in Southeast Asia. It will save some equipment to handle any additional capacity until these Lockheed Super Constellation on order arrive from the U.S. sometime next year.

A former director of India's Tata Airlines has been quoted as wondering "What would happen if the U.S. somehow found itself unable to meet the 'Super Constellation' both of the U.S. airlines?"

American Airlines delivered its 40th anniversary of their first flight. The lack of space partly compensating companies overseas for the remainder of the fleet.

Board Sets 18-Cent Rate for Mail Tests

Civil Aeronautics Board has set a temporary rate for air transportation of surface mail in an expansion of the Post Office experiment to 10 cities on the West Coast (AVIATION WEEK Oct. 15, p. 13).

CAB set 19¢ cents a ton-mile as the rate to be used by airlines until a permanent rate is set for the service. Northwest, United and Western Air Lines are authorized as participating in the project.

The new payment is about the same as the 18¢-20¢ rate used in the earlier air mail service experiment between Chicago and Florida and Chicago and New York and Washington.

The Post Office Department wants the program to show before the Christmas mail. Originally, a Nov. 1 starting date had been set. Board action will allow the department to get the project underway immediately unless unexpected opposition develops.



Houston Opens \$5-Million Terminal

Approximately 100,000 sq. ft. of additional space is available to airlines, government and administrative offices in the new \$5-million terminal (freight facilities dedicated to air) at Houston (Tex.) International Air-

port. A portion of the terminal is a 13 room hotel on the terminal's first floor. The "double-deck" terminal is built on a 35-acre site. The terminal is located 18 mi. from the downtown area of Houston.

Air Policy Boost

- Weeks says he will push AOC recommendations.
- Report serves as guide, not law, he points out.

Recommendations made by the President's Air Coordinating Committee last May will be implemented to the fullest extent, Secretary of Commerce Sinclair Weeks told Aviation Week.

In an exclusive interview, Secretary Weeks said AOC's report is not a "recommendation" of law, as some people would like to think.

Weeks emphasized that the AOC is just a sincere statement of the Administration's air policy, and attempts will be made to see that its recommendations are followed.

► **Miles Controversy**—Although it now is over six months old, the AOC report still is a source subject of controversy in airline and Washington circles. Critics charge Democrats held that the Administration has stopped out of fear of claiming any power of policy decisions over Civil Aeronautics Board.

Big contention is that CAB is a quasi-judicial agency, established by Congress under the Civil Aeronautics Act. They claim that when Congress sends the Board to change its policies, Congress will intend to revise the Civil Aeronautics Act.

Weeks replied with the argument that the AOC report is the choice Ad-

ministration policy. "To serve as a guide, not as a law, in formulating civil air policy."

► **Health, Economically Sound**—Critics also attempt to make the point that the report favors antitrust policies among the large airlines, especially in the international field.

"Nothing could be further from the truth," said Weeks. "We have clearly declared ourselves in favor of healthy, economically sound competition over all others. What the Administration is not to suppress a movement, whether it be antitrust legislation, the cost of which comes out of the taxpayer's pocketbook."

Disputed is in the validity of reason that the federal control establishment of a single U.S. airline in international competition. Weeks was emphatic.

Again, I am definitely against economic duplication. But these are many issues currently being opened by our big airlines that warrant the examination of some plans we carry.

In favor of consolidating the work units, at the same time fostering competition on those routes where the traffic will stand at it.

► **MWA Criticism**—The Secretary left no doubt as to where he stood on the question of criticism for Sea Board & Western Airlines as a loss Atlantic all-cargo carrier.

"Again, it's a question of control," he said. "But the war we're had four all-cargo airlines in that country. It wasn't long before this was whittled down to two. Now, just recently, the two became one. Then they split again, one going out of business."

"That's the history of our all-cargo operations. You be the judge."

Weeks declined comment on any other specific airline issues, either domestic or international. He also declined comment as to the issue of the air-tariff reduction on transport, scheduled for release by the special General Committee on Legislation. Weeks is committee chairman. —FS

CAA Sets Up Viscount Certification With ARB

Civil Aeronautics Administration and Bureau's Air Registration Board have agreed on conditions under which the Viscount Viscount will be certified for service in the U.S., according to William B. Weeks, chief of CAA's Aircraft Engineering Division.

He and Captain Andrew First Viscount will be certified automatically when the following transport service in the U.S. is not flying, carrying a British ARB certification plus a statement that CAA requirements have been met.

Weeks said performance of the Viscount will be based on CAA standards (not on any specific model in this country). The ARB, he said, has agreed to monitor fulfillment of a list of 35 points on which ARB and CAA have different requirements.

CAA's demands, Weeks said, will have no practical effect on the payload of the Viscount in operation on Captain's routes. Chief performance, he said, must meet CAA standards as a standard set but has been reduced for conditions of full-temperature operations.

Agreement was reached at Washington meetings attended by David Jensen of the ARB and representatives of both Vickers and B&W-Ney, manufacturers of the helicopter engine.

Feederlines Name Floberg Chairman

John Floberg, former Assistant Secretary of the Navy for Air, has been selected chairman of the Conference of the Local Service Airlines by the participants of the 14 member firms. He will continue as a member of the Washington branch of the law firm, Kirkland, Fleming, Green, Martin, and Ellis.

He succeeds Donald Nyrop, who resigned to become president of Northwest Airlines.

A graduate of Harvard Law School, Floberg served in the Navy during World War II. He was appointed a Navy Assistant Secretary in 1949, following the Navy's report against Air Force's B-36 program, and served until 1953. He also was a member of Air Coordinating Committee and R&D

SHORTLINES

► **Allegheny Airlines** reports a \$150 gain in traffic over last year for the third quarter of 1954, carrying 886,666 passengers, 11,387,000 passenger miles. Traffic for the first six months accounted 575 and passenger miles were 6,125.

► **British Overseas Airways Corp.** has been approved to buy company to U.S. cargo trade. Machinery, electrical equipment and vehicles together total 11% of U.S. cargo revenue. Seventy-five, professional and personal materials and supplies items used with 101%.

► **Chickamauga Airlines** has been awarded two DC-4s to Soviet Airlines and has contracted to do all future maintenance on Russia's entire fleet.

► **New York Airways** has started the first pre-arranged scheduled air express service with helicopters between points in the New York area. NYA is the first scheduled airline to work with express to express service.

CAB ORDERS

(Oct. 12-19)

ORDERED

► **Permittees for Malabar Airlines** to begin early next service at Pittsburgh, Pa., on flights to most of the daily schedule.

► **Permittees for Illinois and Florida, S. D.** to intervene in the application to Western Air Lines for amendment of its certificate on Route 33.

► **Unlawful of action on application to Hawaiian Flight Forwarders, Ltd., and Aloha Airways & Flight Traffic, Inc.** to complete airfreight operations as independent airfreight forwarders.

► **Permittees for Southern Airways** to add service at Dulles, Va., on one scheduled flight daily.

► **Interruption of its intended operations to New York Airlines** on Route 2.

► **Permittees for Capital Airlines and Trans World Airlines, the P. Wayne (Dad) Clark** of California and the City of Toledo to intervene in an application by Delta Air Lines for amendment of its certificate on Route 54.

APPROVED

► **Interim agreement** regarding Northwest Airlines, Pan American World Airways, various other airlines and routes.

(Oct. 15-Nov. 1)

GRANTED

► **Pan American World Airways'** application for a temporary certificate under New York, Germany, once a week as an intermediate point between Pittsburgh and

Stuttgart on PAA's all-cargo flight, with a decision to amend its application to be filed for permanent authority.

► **Leave to intervene in the commercial carrier operations** over its American Airlines, Capital Airlines, Delta Air Lines, Eastern Air Lines, National Airlines, Pan American World Airways, Trans World Airlines, Northwest Airlines and various other airlines.

► **Northern Consolidated Airlines** application for authorization to continue serving Cape Canaveral, Florida, and a decision to be reached on the same basis to serve one

APPROVED

► **New York Airways** flight routes using its passenger aircraft between New York, N.Y., and New York's LaGuardia Airport

and between Shearfield, Conn., and La

Gardner.

AMENDED

► **Wheeler Airlines'** authorization to conduct aerial photographic survey flights to terminate Oct. 1, 1954, instead of Nov. 1. Photographic Survey Corp.'s application not to perform aerial photography and to have public aviation flights to terminate Nov. 1, 1954, instead of Oct. 30.

DISMISSED

► **Standard Airways** application for action to terminate its operations with the Civil Aeronautics Board during the emergency created by the strike of American Airlines pilots since the emergency no longer exists.



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